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MATERIALS TOWARD A MONOGRAPH OF THE GENUS VERBENA. XXIII

Harold N. Moldenke

VERBENA PLATENSIS Spreng.

Additional bibliography: Rév. Hort. 1896: 188. 1896; Kuntze, Rev. Gen. Pl. 3 (2): 257. 1898; Haage & Schmidt, Cat. Général 93. 1898; Chod., Bull. Herb. Boiss., sér. 2, 2: 818. 1902; Chod., Plant. Hassler. 9: 197. 1902; Ed. Rodigas, Bull. Arboricult. Belg. 1902: 113. 1902; L. H. Bailey, Cycl. Amer. Hort., ed. 1, 6: 1912 & 1916. 1902; Briq., Arkiv Bot. Stockh. 2 (10): 9--10. 1904; Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1056--1057. 1904; Briq. in Chod. & Hassler, Plant. Hassler. 10: 477--478. 1904; Macloskie in W. B. Scott, Rep. Princeton Univ. Exped. Patag. 8 (2): 689. 1905; Hicken, Chlor. Plat. Argent. 197. 1910; Pollard in Webster, New Internat. Dict. Eng. Lang. 2275. 1917; L. H. Bailey, Stand. Cycl. Hort. 6: 3445. 1917; Sanzin, Anal. Soc. Cientif. Argent. Buenos Aires 88: 98, 112, & 134. 1919; Molfino, Physis 5: 285. 1921; Olmsted, Coville, & Kelsey, Stand. Pl. Names, ed. 1, 521. 1924; Hegi, Illustr. Fl. Mittel-Eur. 5 (3): 2240. 1927; Melville & Sm., Rep. Bot. Exch. Club Brit. Isles 1927: 452. 1928; Herter, Florula Urug. 106. 1930; Seckt, Rev. Univ. Nac. Córdoba 17: 91. 1930; Stapf, Ind. Lond. 6: 431. 1931; Parodi, Rev. Argent. Agron. 1: 202. 1934; L. H. & E. Z. Bailey, Hortus, new rev. ed., 631 & 632. 1935; Dermen, Cytologia 7: 161 & 162. 1936; H. S. Marshall, Kew Bull. Misc. Inf. 1936: 94. 1936; Troncoso, Darwiniana 3: 53 & 54. 1937; Herter, Revist. Sudam. Bot. 4: 186—187. 1937; P. C. Standl., Field Mus. Publ. Bot. 18: 1015. 1938; Moldenke, Alph. List Common Names 32. 1939; L. V. Barton, Contrib. Boyce Thompson Inst. 10: 401, 410, 411, 525, & 425. 1939; Beale, Chron. Bot. 5: 517. 1939; Parodi, Darwiniana 4: 55. 1940; Beale, Journ. Genet. 40: 338—340, 342, 348, 350, 354, & 355. 1940; Moldenke, Suppl. List Common Names 17 & 23. 1940; Moldenke, Suppl. List Invalid Names 8--10. 1941; Schnack, Anal. Inst. Fitotéc. Sta. Catalina 4: 18—21. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 41, 42, 44, 74, & 102. 1942; Moldenke, Alph. List Invalid Names 46 & 49—51. 1942; Herter, Revist. Sudam. Bot. 7: 225. 1943; Schnack & Covas, Darwiniana 6: 471, 473, & 475. 1944; Rosengurtt, Estud. Prad. Nat. Urug. 4: 30. 1944; Schnack & Covas, Darwiniana 7: 71 & 72. 1945; Cabrera, Bol. Soc. Argent. Bot. 1: 67. 1945; Ind. Taxonom. 1 (14-16): 6. 1945; Darlington & Janaki Ammal, Chromosome Atl. 270. 1945; Moldenke, Phytologia 2: 87 & 116. 1945; Barton & Garman, Contrib. Boyce Thompson Inst. 14: 243, 246, & 252. 1946; Rosengurtt, Estud. Prad. Nat. Urug. 5: 395. 1946; Augusto, Fl. Rio Grande do Sul 209 & 232. 1946; Moldenke, Alph. List Cit. 1: 18, 47, 50, 72, 84, 85, 87, 202, 212, 219, & 264. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 10, 26, & 27. 1947; Moldenke, Phytologia 2: 387. 1947; Moldenke, Castanea 13: 121. 1948; Moldenke, Alph. List Cit. 2: 357, 358, 378, 458, 481, 532, 533, 561, 575, 627, & 629 (1948), 3: 673, 688, 696, 744, 766, 780, 781, 799, 874—

876, 909, 913, & 921—923 (1949), and 4: 1010, 1084, 1100, 1249, & 1304. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94, 99, 100, 102, 106, 164, & 199. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 14. 1949; Moldenke, Phytologia 3: 141 (1949) and 3: 291. 1950; N. Y. Bot. Gard. Seed Exch. List 1951: 5. 1950; Moldenke, Phytologia 3: 467. 1951; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 70. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2208, 2209, & 2212. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 101. 1953; Lombardo, Invent. Pl. Cult. Montevid. 232. 1954; Moldenke, Journ. Calif. Hort. Soc. 15: 80. 1954; Moldenke in Humbert, Fl. Madag. 174: 8. 1956; Mattoon, Pl. Buyers Guide, ed. 6, 287. 1958; Moldenke, Am. Midl. Nat. 59: 349, 350, & 357. 1958; Moldenke, Résumé 110, 118, 120, 122, 128, 129, 224, 296, 357, 360, 362, 371, 372, 374, 376, & 473. 1959; Moldenke, Résumé Suppl. 1: 7 (1959), 2: 12 & 13. 1960; Moldenke, Phytologia 8: 120, 121, & 123 (1961) and 8: 184, 185, 257, 280, & 316. 1962; Moldenke, Résumé Suppl. 3: 29 & 40 (1962) and 5: 8. 1962; A. Putz, N. Y. Herald Trib., sect. 4, p. 18, February 4. 1962; Moldenke, Résumé 6: 9 & 11 (1963) and 7: 5 & 10. 1963; Moldenke, Phytologia 8: 469 (1963), 9: 178, 305, 308, 315, 316, 329, 330, & 333—336 (1963), 9: 354, 366—368, & 388 (1964), and 10: 128, 129, 288, & 289. 1964.

Illustrations: Paxt., Mag. Bot. 5: 243 [in color] & 244. 1838; Floricult. Cab. 7: 22 [in color]. 1839; Hook. in Curtis, Bot. Mag. 65: pl. 3694 [in color]. 1839; Maund, Bot. Gard. 9: pl. 197 [in color]. 1839—1851; J. W. Loud., Ladies Fl.-Gard. Ornam. Perenn. 2: pl. 91 [in color]. 1844; Vilm., Alb. de Cliches, ed. 2, fig. 25685. 1888; Rév. Hort. 1896: 188. 1896; L. H. Bailey, Cycl. Amer. Hort., ed. 1, 6: 1912 & 1916. 1902; L. H. Bailey, Stand. Cycl. Hort. 6: 3445. 1917; Sanzin, Anal. Soc. Cientif. Argent. Buenos Aires 88: 112. 1919.

Annual or perennial, tufted, procumbent or creeping herb, usually 30--70 cm. tall, much branched, stiff or sometimes almost suffrutescent at the base and then to 2 feet tall; stems and branches ascending-erect or rooting at the nodes near the base, spreading-hirsute or firmly hispid, the stems subterete, the branches tetragonal; internodes abbreviated; leaves decussate-opposite, sessile or subsessile, rather rigid, green, varying from ovate, lanceolate-oblong, or subovate-elliptic to rather broadly ovate-elliptic or oblong-triangular (the lower ones usually oval or oblong, the uppermost ones triangular or lanceolate), thick-textured or almost fleshy, revolute margined or folded together, 2--5 cm. long, about 1.3 cm. wide, acute or obtuse and short-apiculate at the apex, shortly cuneate and entire at the base and narrowed into the short petiole, sinuately serrate or more or less regularly crenate or crenate-dentate with obtuse teeth above the base, the uppermost crenations 1--1.5 mm. long and 2--5 mm. apart, or irregularly and deeply incised-dentate or even subpinnatifid-dentate, more or less rugose-wrinkled and glandular-hirtellous or pilose-pubescent above, pilose-pubescent or hirsute-tomentose beneath and hispid on the venation, the venation usually more or less deeply impressed above, prominent

or prominulous beneath, pinnate, anastomosing toward the margins; spikes terminal, solitary or ternate, long-pedunculate, dense or very dense, mostly considerably elongate even during anthesis with closely imbricate flowers, or at first in abbreviated spikes, glandular-hirtellous; flowers erect, fragrant in the evening and night, with the odor of jasmine (Jasminum); bractlets subulate-lanceolate to lanceolate-acute, half to one-third as long as the calyx, 5--6 mm. long, pilose and ciliate; calyx membranous, sordid-green, long-tubular, 1.2--2 cm. long, much shorter than the corolla-tube, canescent-hirtellous or densely and rather long spreading-pilose especially on the rather broad herbaceous ribs, with stipitate glands intermixed, the rim 5-dentate, the teeth short, very unequal, acute, the 3 posterior ones shorter and lanceolate, about 1.8 mm. long, the 2 anterior ones longer and lanceolate-subulate, 2--3 mm. long; corolla large, usually white or fading in age to slightly pinkish, pinkish-white, white-rosy, or "white with a rosy tinge", hypocrateriform, its tube cylindric, 2--2.5 cm. long, usually twice as long as the calyx and exserted more than 5 mm. from its apex, curvate, the limb 1.5 cm. wide, glabrous on the outside, almost regular, barbate in the throat, 5-lobed, the lobes to 6 mm. long, erecto-patent, slightly emarginate and undulate, the emarginations 1--2 mm. deep; stamens didynamous, inserted in the upper part of the corolla-tube, included; style long-exserted from the calyx after the corolla has been shed, surpassing the calyx-teeth by 5--6 mm., capillary below, dilated above; stigma laterally corniculate; fruiting-calyx spirally twisted at the apex, covered with hyaline stipitate glands; fruit 4 mm. long, the cocci 4, subterete at maturity, venose and (except for the very base) reticulate-scrobiculate on the back, the commissural face narrowly bisulcate, the testa leathery; chromosome number: 2n = 10.

The type of this handsome species was collected by Friedrich Sellow at Montevideo, Uruguay, and was deposited in the herbarium of the Botanisches Museum at Berlin, now destroyed. Macbride's photograph of it (no. 17452) is inscribed "Verbena teucrioides var. platensis". Another Sellow collection, inscribed "Brasilia" (Macbride type photo no. 34356), in the same herbarium was the type of V. scordioides. Verbena teucrioides was based on collections made by John Gillies at the Uspallata Pass and at Cerro de Portazuela in the Andes Mountains. Briquet's V. platensis var. latiuscula was based on Regnell I:A.3649 and A.3905 from Paraguari, Paraguay, collected in October, and deposited in the Delessert Herbarium at the Conservatoire et Jardin Botaniques at Geneva, the former said to be "specimina densius pilosa". Briquet says "Specimina Lindmaniana ad hanc unicam varietatem pertinent. Planta 30--50 cm. alta, validor. Folia subsessilia, ovata vel latiuscule ovato-elliptica, superficie ad 3 x 1,3 cm., ± regulariter crenata, crenarum culminibus 1--1,5 mm. altis et 2--5 mm. distantibus, nunc etiam complicatis. Spicae longius pedunculatae." I regard this as typical V. platensis Spreng.

Verbena chamaedryfolia f. foliosae was based on Hassler 4428,

collected on a campo near the Río Capibary, Paraguay, in September, and deposited in the Delessert Herbarium at Geneva. Of it Chodat says "forma foliosae i.e. foliis latioribus, tenuibus. Herba 0,3--0,5, petala violacea." Concerning V. platensis var. latiuscula Briquet says "Plants 30--50 cm. alta, validior. Folia subsessilia, ovata vel latiuscule ovato-elliptica, superficie ad 3 x 1,3 cm., regulariter crenata, crenarum culminibus 1--1,5 mm. altis et 2--5 mm. distantibus. Spicae longius pedunculatae. Herba 0,3--0,5 m. alta, petala violacea, in campo prope fl. Capibary, Sept., [Hassler] n. 4428; suffrutex 0,5--1 m. altus, petala cyanea, in valle fluminis Y-aca, in campo, Chololo, Dec., n. 6624; suffrutex 0,3--0,6 m. altus, petala rosea, prope Tobaty in rupestribus collium, Sept., no. 6357; suffrutex 0,3--0,6 m. altus, petala coerulea, in valle fluminis Y-aca, in campo prope Valenzuela, Jan., n. 6936. Nous rattachons encore au V. platensis var. latiuscula un échantillon unique: 'herba 0,25 cm. alta, corolla violacea, in culmine coll. Cerritom Jan. n. 102'. Cet échantillon possède des feuilles supérieures à crénelures plus denses et un calice un peu plus long. Il conviendrait pour élucidar entièrement cette forme de l'étudier sur des matériaux plus abondants."

Verbena platensis has been found in sandy rocky dry sunny soil along roadsides, rocky fields, hillsides and rocky hills, rocky mountains, rocky slopes and rocky places in general, rocky grassy slopes, meadows, campos, sandy soil by streams, in good soils and granitic soil, among igneous rocks, and in limestone regions, at altitudes of 30 to 4000 meters, blooming from September to March. Rosengurtt describes it as frequent in grassy clearings, and Haumann calls it "common" and "abundant" in Buenos Aires. On the other hand, Legrand calls it "rare" in Uruguay and Schulz says that it is "rare" in Salta, while Osten avers that it is only found on fern-covered ground.

Common names recorded for the species include "flor de vovia", "germanderartige Verbene", "germander-leaved verbena", "germander-like vervain", "margarita blanca", "margarita colorado", "margarita punza", "piedra", "verbena", "verbena blanca", "verveine odorante", and "verveine teucrioïde", while STANDARDIZED PLANT NAMES recommends the name "fragrant verbena".

The species seems to have been introduced into cultivation in 1837; in 1841 it was in cultivation in Switzerland inasmuch as it is said to have been one of the parents of V. anaïs Hort. in that year. Troncoso (1937) reports it as cultivated as an ornamental plant in gardens and parks in Buenos Aires. Bailey (1935) states that its seeds are offered to the horticultural trade by Floraire and by Vilmorin. In 1898 its seeds were offered as no. 5922 by Haage & Schmidt. Mattoon (1958) says "V. candidissima" is offered by Hirst & Son, London. In cultivation the plant is said to flower in summer and autumn. It is recorded as adventive in England by Douglas H. Kent in a letter to me dated November 28, 1949 -- cfr. also Rep. Bot. Exch. Club Brit. Isles 1927: 452 (1928) where a Melville & Smith collection from Dagenham, Essex, is recorded.

Lemaire (1842) gives the following interesting description: "La Verbena teucrioides fut découverte pas le docteur Gillies sur les parties les plus élevées des monts Uspalata, au Chili, à plus de 3,250 mètres au dessus du niveau de la mer. Elle fut trouvée plus tard croissant aussi sur les montagnes des environs de Montevideo, ainsi que sur le Pain-de-Sucre, dans la province de Buenos-Ayres. C'est une plante presque suffrutiqueuse, dressée, rameuse, s'élevant à environ 60--70 centimétres de hauteur, couverte de toutes parts de poils raides, souvent glanduleux; munie de feuilles lancéolées-oblongues, profondément incisées, sessiles; à nervures enfoncées profondément sur la face supérieure, saillantes inférieurement; à fleurs nombreuses, en épis terminaux, allongés, serrés, et à calyces allongés, se tordant après l'anthèse. Ces fleurs, d'un blanc jaunâtre passant au blanc rosé, exhalent une odeur très suave rappelant assez l'arôma de Jasmin, et dont l'intensité est surtout remarquable de soir et pendant la nuit."

Rümpler (1873) describes it: "Brasilien. -- Einjährig, im Gewächshause ausdauernd. -- Mehr oder weniger steifhaarige Pflanze mit sehr verästetem Stamme, die Aeste aud dem Boden liegend, hier sich einwurzelnd, dann aufrecht, bis 30--40 Centimeter hoch werdend. Blätter gegenständig, kaum gestielt, die unteren oval oder länglich, die oberen fast dreieckig, lanzettlich, alle ungleich eingeschnitten-gezähnt. Blumen sehr wohlriechend, weisz oder rosaweisz, in einfachen oder dreizähligen, Anfangs dichten und doldenartigen, dann verlängerten Trauben; jede Blume hat ein pfriemliches, behaartes Deckblatt, das zwei Mal kürzer, als der Kelch, welcher seinerseits wieder viel kürzer ist, als die Röhre der Blumenkrone. Letztere ist grosz, auszen glatt, mit fast regelmäszigem, am Schlunde bärtigem Saume mit schwach ausgerandeten Lappen.....Dieser Art hat durch die Kultur nicht unbedeutende Abänderungen erfahren; man betrachtet sie und die folgende als den Ausgangspunkt fast aller jetzt in den Gärten kultivierten Varietäten."

Rosengurtt (1946) calls it "Mala hierba perenne, hemicriptófita paquiriza de tallos radicantes perennes estolonifromes; florece en primavera, prolongándose hasta el verano; las flores son fragrantes y decorativas. Vive en campos vírgenes, pobres y balastosos, o pedregosos."

Briquet (1904) says "Schauer avait cité dubitativement le V. platensis à propos du V. teucrioides Gill. et Hook. M. O. Kuntze à la premier établi la synonymie des V. platensis et V. teucrioides par l'examen des originaux de Sprengel. De notre coté, nous possédons à l'Herbier Delessert la plante de Sellow sur laquelle Sprengel à basé son V. platensis et qui a plus tard été décrite à nouveau par Chamisso sous le nom de V. scordioides. La synonymie ci-dessus nous paraît donc maintenant définitivement élucidée.... Le V. platensis ayant souvent été confondu avec d'autres espèces du group, nous croyons utile d'en donner ici une description complète." Whereupon he gives a detailed description, in which, however, he makes the amazing statement that "Corolla coerulea vel

violacea" — apparently indicating that the only specimen or specimens before him which gave any indication of corolla color on their labels were of f. violacea Moldenke.

He continues: "Le V. platensis se distingue aisément du V. megapotamica par sa taille moins élevée, ses feuilles sessiles ou sub-sessiles, son inflorescence nullement capitulée à la fin de l'anthèse, son calice moins longuement cylindrique à nervures longuement poilues-ciliées etc. Il se sépare aussi sans peine du V. chamaedrifolia Juss. (in Ann. Mus. VII, 73, ann. 1807); Briq. Verb. Balans. Par. p. 2. = V. peruviana O. Kuntze Rev. III, 2, 257; non Britton = Erimus peruvianus L. Sp. ed. 1, p. 630, ann. 1753). Ce dernier type s'en écarte par son calice notablement plus court (ne dépassant pas 1 cm. de longueur) à dents plus courtes, ses tiges procombantes et grêles, ses feuilles élargis et très brusquement rétrécies en un court pétiole à la base etc. On a d'ailleirs très souvent confondu de V. chamaedrifolia avec des espèces voisines. C'est ainsi que le no: 51 de M. Morong, attribué au V. peruviana et provenant de l'Assomption, n'appartient nullement à cette espèce, mais bien au V. megapotamica var. truncatula. Le Verbena peruviana est basé sur une plante de l'Uruguay et de l'Argentine, figurée par Feuillée (Journ. observ. phys. etc. III, 25, fig. 3, ann. 1725), qui manque à la flore du Paraguay."

In my opinion, the Morong 51 mentioned above is typical V. incisa Hook.; I also see no specific difference in the V. peruviana of Britton and that of Kuntze. Osten, in a memorandum dated at Montevideo in January, 1931, says: "Ein weiteren grober Irrthum Briquet's betrifft V. teucrioides Gill. für welche Art er den zweifelhaften Namen Sprengels 'platensis' nimmt, dem er violette Blüten zuschreibt. V. teucrioides Gill. kommt in Paraguay auscheinend nicht vor und die von Briquet's platensis Spr. genannte Pfl. is V. marrubioides Cham. Hassler schrieb mir sein Einverständniss damit.....V. teucrioides Gill. hat wohlriechende gelblichweisse-reinweisse Blüten, kommt nur auf steinigen Boden (Granit) vor und ist von mir häufig in Uruguay, Sierra Pampeanas (Süden v. Bras.) gesammelt worden, ebenso habe ich sie aus den (alten) centralen Gebirge Argentiniens (z.B. Cordoba) wahrend sie in die jüngeren Cordilleren noch nicht eingedrungen zu sein scheint. Es scheint mir ein Fehler zu sein, alte, kannte sich Langem gebrauchte Namen wir teucrioides durch vielleicht ältere aber nicht einmal sichere Namen zu vertauschen. Cf. Walpers Repert. IV p. 33 sub no. 90. 'platensis: species haec inter plantas Selowii relictas, qui eam misit, non reperta pro cive dubio habenda etc.'" According to Briquet, however, the original types of both names were preserved in Berlin and Geneva and were compared there by Kuntze and by Briquet, so there seems to be no doubt now about their conspecificity.

Walpers (1845) kept V. scordioides Cham. separate from V. teucrioides Gill. & Hook. and classified both in his Section Verben-

aca, Subsection Inermes, Group Foliosae, Subgroup Macranthae, and Secondary Subgroup Melindres along with 9 other species. Standley (1938) applied the name V. teucrioides to the plants now more properly termed xV. hybrida Voss, saying "Verbena. Cultivated commonly in gardens as an ornamental plant. Native of southern South America. The common garden verbena, with flowers varying from white to pink, red, or purple, is a favorite garden flower of Central America, especially in the temperate regions. The proper specific name of the garden plants, which may be in part of hybrid origin, is somewhat uncertain." Similarly, the work reported on by Barton (1939) as having been done with V. platensis was actually done with xV. hybrida.

It should be noted here that the V. anaïs Hort., V. teucrioides var. anais Lem., V. teucrioides var. anaïs Lem., and V. teucrioides anais Lem. regarded by me in previous publications as synonyms of V. platensis, are actually to be placed in the synonymy of xV. hybrida Voss since Lemaire definitely states that they are based on interspecific hybridization. The names V. teucrioides auriculiflora Regel, V. teucrioides var. auriculiflora Regel, V. teucrioides hybrida Vilm., and V. teucrioides x venosa Hort. also refer to xV. hybrida, while V. teucrioides x chamaedryfolia Osten is xV. osteni Moldenke. The only definitely known and named natural hybrid involving V. platensis is with V. peruviana (L.) Britton and is xV. osteni. The Herter 750b specimen in the United States National Herbarium at Washington has flowers that appear to be rather small for V. platensis -- possibly xV. osteni is involved here. The Vilmorin illustration cited above does not look exactly right for V. platensis -- it may represent xV. hybrida instead.

I suspect that most, if not all, of the records of pinkish or slightly rosy corollas represent flowers that are fading due to age.

Specimens of V. platensis have been misidentified and distributed in herbaria under the names V. chamaedryfolia Juss., V. coccinea Hort., V. odorata Meyen, and V. peruviana (L.) Britton. On the other hand, the Calderón 646 and Herb. Hort. Bot. Basil. s.n. [Aug. 1841] distributed as V. platensis are actually xV. hybrida Voss; Archer 4666 and Jürgensen 3772 are V. incisa Hook.; and Hassler 1105 is V. kuntzeana Moldenke.

Schauer (1847) cites a Sellow s.n. from "in campis Brasiliae meridionalis" and an Arsène Isabelle s.n. from Montevideo; Augusto (1946) also cites Isabelle s.n. from Montevideo, while Troncoso (1937) cites her no. 386 from Buenos Aires. Previous records of this species from Paraguay by me in various of my publications were based on Hassler 11052, which is now regarded by be as being V. kuntzeana Moldenke.

In all, 116 herbarium specimens and 16 mounted illustrations,

included type or phototype material of most of the names involved, have been examined by me.

Citations: CUBA: Havana: Van Hermann 876 (N). BRAZIL: State undetermined: Sellow s.n. [Brasilia; Macbride photos 34356] (Bm, Br, F--photo, Kr--photo, N--photo, N--photo, Si--photo, Z--photo). URUGUAY: J. Anderson 131 (Bm); Arechavaleta 25 (Ug); Berro 72 (N), 5521 (N), 6719 (N); Cabrera 3852 (N); Castellanos s.n. [Nov. 1, 1946; Herb. Inst. Miguel Lillo 15776] (N, N); Collector undesignated s.n. [Maldonado, March 10, 1885] (Ug), s.n. (Ug); Gallinal, Aragone, Bergalli, Campal, & Rosengurtt B.810 (Ug--8772, W--1858123); PE.5056 (N,S, Ug--7097, Ug--10997, W--1904089); Herb. Mus. Hist. Nat. Montevid. s.n. [Pan de Azucar, Feb. 1909] (Ug); Herter 750 [Herb. Herter 82668] (B), 750a [Herb. Herter 85298; Herb. Osten 22635] (Ca--407186, N, S, Ug, W--1444423), 750b [Herb. Herter 85476] (Ca--453205, N, W--1934633), 750c [Herb. Herter 91079] (N), 750d [Herb. Herter 50367] (B), s.n. [Estancia Santa Clara, Sept. 29, 1926; Herb. Osten 19119] (S, Ug), s.n. [Santa Clara, Oct. 2, 1926; Herb. Osten 19188] (Ug); Legrand 1116 (Ug), 1567 (Ug), 2265 (Ug), 4508 (N, Ug); Montoro Guarch 579 (N), 2903 (N); Née 78 (Q), 93 (Q); Osten 2876 (Ug, Ug), 3177, in part (Ug), 3195, in part (F--photo, N--photo, Sg--photo, Ug, Z--photo), 11594 (S, Ug), 20080 (Ug, Ug); Rosa-Mato 566 (Ug--9814); Rosengurtt B.810 (Ca--79856, N), B.2133 (N), B.2882 (N), B.3010 (N), B.4577 (N); Schröder s.n. [Piedras de Afilar; Herb. Osten 19455] (Ug); Sellow s.n. [Montevideo; Macbride photos 17452] (Kr--photo of type, N--photo of type, N--photo of type); Teisseire s.n. [Estac. Moreno, 1913] (Ug--4476). ARGENTINA: Buenos Aires: Boffa 18 (N, N, S); Bruch 4091 (N); Cabrera 5166 (N), 6570 (N); Dusén 6281 (S); Eyerdam, Beetle, & Grondona 23419 (Ca--627492); Hauman s.n. [Sierra de Tandil, XII.1905] (Br), s.n. [Sierra de la Ventana, I. 1924] (Ur); Hauthal 63 (N); Herb. Bot. Mus. Lund. s.n. [Rio de la Plata] (Lu); Krapovickas 2924 (N); Kuntze s.n. [Tandil, Nov. 1892] (N); Kyle s.n. [Enero 1892] (Bm); Osten 2637 (Ug); Parodi 13864 (N); Reutzell 1101 (Ca--3312); Ruiz Huidobro 1175 (S), 1281 (S), 1575 (S). Catamarca: Jürgensen 1297 [Herb. Osten 11350] (Ug, W--1121006). Córdoba: Hieronymus s.n. [10.XI.1881] (N); A. T. Hunziker 7033 (N), 7205 (N); Lossen 117 (Ba, Um--48); A. G. Schulz 5991 (Sz); Sparre 1376 (S); E. Wall s.n. [La Falda, 15/12/46] (Ew); Wall & Sparre s.n. [La Falda, 15/12/46] (Ew). Corrientes: Bonpland 409 (N, N, W--2343495, W--2343497), s.n. [Corrientes] (N). Salta: Parodi 13467 (N); Schreiter 6620 [Herb. Inst. Miguel Lillo 32820] (N, N); A. G. Schulz 2892 (N). San Luis: Varela 651 (Ca). Tucumán: Monetti 1943 [Herb. Inst. Miguel Lillo 31338] (Vi). State undetermined: Friedman s.n. [1923] (Ba); Kurtz 6780 [Guasapampa] (N). CULTIVATED: Belgium: M. Martens s.n. [h. b.

lov. 1839] (Br), s.n. [Hort. Cels.] (Br). Ecuador: Firmin 307 (N, W--1420001). El Salvador: P. C. Standley 23652 (W--1139336). Germany: Herb. Prager 18640 (Gg--31459). Massachusetts: L. H. Bailey s.n. [Feb. 1884] (Ba). New York: T. H. Everett s.n. [N. Y. Bot. Gard. Cult. Pl. 97/46] (N); H. N. Moldenke 18652 (N). Uruguay: Moldenke & Moldenke 19939 (N). MOUNTED ILLUSTRATIONS: Paxt., Mag. Bot. 5: 243. 1838 (N), 244. 1838 (N); Vilm., Alb. de Cliches, ed. 2, fig. 25685 (N).

VERBENA PLATENSIS var. STENODES Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1056. 1904.

Synonymy: Verbena chamaedryfolia f. strigosa Chod., Bull. Herb. Boiss., sér. 2, 2: 818. 1902.

Bibliography: Chod., Bull. Herb. Boiss., sér. 2, 2: 818. 1902; Chod., Plant. Hassler. 9: 197. 1902; Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1055—1056. 1904; Briq. in Chod. & Hassler, Plant. Hassler. 10: 477—478. 1904; Moldenke, Suppl. List Invalid Names 8. 1941; Moldenke, Alph. List Invalid Names 46. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 44 & 102. 1942; Moldenke, Alph. List Cit. 1: 16 & 96 (1946), 2: 369, 374, 381, 442, 458, 535, & 600 (1948), 3: 660, 733, & 746 (1949), and 4: 1090, 1091, 1093, & 1302. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 106 & 199. 1949; Moldenke, Phytologia 3: 290 & 378. 1950; Moldenke, Résumé 128, 362, & 473. 1959; Moldenke, Résumé Suppl. 6: 7 (1963) and 7: 5 & 6. 1963.

This variety differs from the typical form of the species in having much narrower leaf-blades, oblanceolate-cuneate, subcoriaceous, rugose on both surfaces, the venation more robust beneath, and the stems subsimple. It is described as a creeping herb, with fragrant flowers, the corollas white or blue to yellow, the tube pale-pink on the outside.

The type of this variety was collected by Emil Hassler (no. 5758) on the campo near Caraguatay, Paraguay, in December, and is deposited in the Delessert Herbarium at the Conservatoire et Jardin Botaniques in Geneva. Chodat says of it "foliis oblanceolato-cuneata subtus robustius nervosus, subtus et supra rugosis subcoriaceis, caulibus subsimplicibus. Suffrutex 0,3—0,4, petala coerulea". Briquet says of it "Planta 30—40 cm. alta. Folia sessilia, infima tantum subsessilia, angustius oblongo-elliptica, superficie ad 3,5 x 0,8 cm. regulariter crenato-dentata, dentium culminibus 1—1,5 mm. altis et 2—3 mm. distantibus. Spicae (an constanter?) brevius pedunculatae. Suffrutex 0,3—0,4 m. alta, petala coerulea."

The variety has been found by collectors on hillsides, among debris on mountain slopes, in dry river valleys and among rocks in dry riverbeds, in dry fields and dry open campos, at altitudes of 700 to 1800 meters, flowering in August and from October to January. The Herb. Osten 11350 specimen cited below bears a note to the effect that "the habit of the mountain plant is different from that of the plains, namely the leaves are narrower -- probably 2

vars. or subvars."

Material of this variety has been misidentified and distributed in herbaria under the names V. platensis Spreng., V. teucrioides Gill., and V. teucrioides Hook., and as "V. teucrioides var. fol. elongato-lanceolatis" by Osten.

In all, 44 herbarium specimens and 2 mounted photographs have been examined by me.

Citations: ARGENTINA: Buenos Aires: Mansel s.n. [Bahia Blanca, 1884] (Bm); Sparre 370 (S). Catamarca: Jörgensen 1297 (Ca--205333), s.n. [Andalgalá, Dec. 1916; Herb. Fac. Cienc. Med. Buenos Aires 1297] (N--photo, Sp--25784, Z--photo), s.n. [El Suncho, Dec. 26, 1916; Herb. Osten 11350] (S); Rodriguez Vaquero 899 (N). Córdoba: Castellanos s.n. [Valle de los Reartes, 15.XII.1920; Herb. Osten 15288] (Ug); F. A. Roig 1046 [Herb. Ruiz Leal 17828] (Sm). Corrientes: Bonpland s.n. [Corrientes] (W--1705992). Jujuy: Burkart & Troncoso 11003 (N). La Rioja: Castellanos s.n. [Herb. Mus. Argent. Cienc. Nat. 33891] (N). Salta: R. E. Fries 615 (S); Garolera & Romero s.n. [La Silleta, 16-I-1947] (Gg--353218, N); T. Meyer 3451 [Herb. Inst. Miguel Lillo 35567] (En, N), 3456 [Herb. Inst. Miguel Lillo 35572] (En, N); Moldenke & Moldenke 19736 (N); O'Donell 4933 (N); Ruiz Leal 14186 (Rl); Schreiter 5079 [Herb. Osten 20020] (Ug, W--1591455), 6620 [Herb. Inst. Miguel Lillo 32820] (Ug--4946), 9476 [Herb. Osten 22901] (Ug); A. G. Schulz 6581 (Z); Sparre 1201 (S); Venturi 5143 (S, W--1591463), 7976 [Herb. Osten 20884] (Du--372483, Gg--166628, Ug, W--1443314, W--1591397); Wall & Sparre s.n. [nw. of Salta, 4/12/46] (Ew, Ew, Ew, Ew, Ew). Tucumán: Bailetti 167 [Herb. Inst. Miguel Lillo 31347] (N); Lillo 2899 [Herb. Inst. Miguel Lillo 31340; Herb. Osten 8459] (N, Ug); Monetti 1943 [Herb. Inst. Miguel Lillo 31338] (N); Venturi 2408 (W--1591254).

VERBENA PLATENSIS f. VIOLACEA Moldenke, Phytologia 3: 177. 1949.

Bibliography: Moldenke, Phytologia 3: 177. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 100 & 199. 1949; Moldenke, Résumé 120 & 473. 1959.

This form differs from the typical form of the species in having its corollas always violet or rose-purple in color.

The type of the form was collected by Cornelio Osten (no. 3195, in part) at Arroyo Grande, Tala, in the department of Soriano, Uruguay, on October 3, 1895, and is deposited in the Osten Herbarium at the Museo de Historia Natural in Montevideo. The specimen was originally annotated by Osten as "V. teucrioides Gill. forma flor. violascentibus". It is mounted on a sheet with a branch of the typical white-flowered form from the same locality. Osten reports that the form was growing along with "V. erinoides", but is not a hybrid with it. With this assertion I agree.

Herter found the form on a stony campo at Santa Clara, at 200 meters altitude, and describes the flowers as rose-purple (xeno-

chromia) and fragrant.

In all, 2 herbarium specimens, including the type, and 4 mounted photographs have been examined by me.

Citations: URUGUAY: Herter s.n. [Herb. Osten 19188] (Ug); Osten 3195, in part (F--photo of type, N--photo of type, Sg--photo of type, Ug--type, Z--photo of type).

VERBENA PLICATA Greene, Pittonia 5: 135. 1903.

Synonymy: Verbena plivata Greene ex Moldenke, Alph. List Cit. 2: 630, sphalm. 1948. Verbena cinerea H.B.K. ex Moldenke, Résumé 362, in syn. 1959.

Bibliography: Greene, Pittonia 5: 135. 1903; Prain, Ind. Kew. Suppl. 3: 187. 1908; Perry, Ann. Mo. Bot. Gard. 20: 248, 261, 294—296, 302, & 356. 1933; Steyerm. & Moore, Ann. Mo. Bot. Gard. 20: 805. 1933; Cory, Texas Agr. Exp. Sta. Bull. 550: 89. 1937; Sperry, Sul Ross State Teach. Coll. Bull. 22: 41. 1941; Moldenke in Lundell, Fl. Texas 3 (1): 16, 17, & 28--29. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 13—15, 19, & 102. 1942; Moldenke, Castanea 10: 40. 1945; Moldenke, Alph. List Cit. 1: 13, 14, 42, 51, 125, 127, 130, 175, 176, 200, 253, 258, & 268. 1946; Moldenke, Phytologia 2: 164 (1946) and 2: 328 & 329. 1947; Moldenke, Wrightia 1: 226--227. 1948; Moldenke, Alph. List Cit. 2: 400, 457, 472--475, 480, 496, 519, 526, 527, 594, 596--598, & 630 (1948), 3: 674, 678, 679, 681--683, 698, 717, 729, 789, 790, 796, 797, 806, 824, 829, 831, 832, 850, 873, 882, 886, 915, 936, 965, & 966 (1949), and 4: 989, 991--993, 996, 998, 1003, 1004, 1098, 1099, 1107--1110, 1122, 1137--1139, 1150, 1151, 1163, 1174, 1183, 1187, 1212, 1213, 1220, 1228, 1230, 1236, 1239, & 1294. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 24--26, 33, & 199. 1949; Moldenke, Phytologia 3: 132. 1949; Waterfall, Rhodora 52: 20 & 38. 1950; Shinners, Spring Fl. Dallas 326. 1958; Moldenke, Résumé 26, 29, 31, 32, 39, 362, & 473. 1959; Moldenke, Résumé Suppl. 2: 3, 4, & 12. 1960; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 144. 1961; Irwin, Roadside Flow. Tex. 190. 1961; Lewis & Oliver, Am. Journ. Bot. 48: 639—641, fig. 20. 1961; Moldenke, Phytologia 8: 124 (1961) and 8: 279. 1962; Moldenke, Résumé Suppl. 3: 7 & 10 (1962), 5: 4 (1962), 6: 3 & 4 (1963), and 7: 3. 1963; Moldenke, Phytologia 8: 471, 473, & 477 (1963) and 9: 34, 36, 156, 165, & 199. 1963; Moldenke, Résumé Suppl. 8: 1 (1964) and 10: 2. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1241. 1964; Moldebke, Phytologia 10: 182 & 285. 1964.

Illustrations: Lewis & Oliver, Am. Journ. Bot. 48: 640, fig. 20. 1961.

Coarse, low, annual or perennial, erect herb, branched at the base; roots fibrous; stems decumbent or ascending, branched, hirtellous; branches erect or ascending, to 2 dm. long, spreading; leaves decussate-opposite; petioles winged; lower leaf-blades oblong-spatulate or elliptic-ovate, 1--4 cm. long, narrowed at the base into a margined petiole of about the same length, broadly obtuse at the apex, plicate, coarsely incised or incised-dentate,

often 3-lobed, more or less canescent, rugose and somewhat appressed-hirsute above, hirsute beneath and prominently marked (particularly near the margins) with whitish veins, the upper ones similar but smaller, often appearing spatulate; spikes terminal on the stems and branches, ordinarily not compact; bractlets green, herbaceous, ovate-lanceolate, usually surpassing the calyx, at times barely equaling it, 5--7 mm. long, 1.5--4 mm. wide, gradually attenuate from the base to the apex, acute at the apex, hirsute, the midrib often noticeable; calyx 3.5--4 mm. long, more or less glandular-hirsute, its lobes very obtuse or subtruncate, terminating abruptly in subulate teeth; corolla varying from blue, bluish-lavender, light bluish-lavender, bluish, bluish-violet, or dark-blue to blue-purple, purplish-blue, purplish-violet, purplish, purple, lavender, pink-lavender, or magenta, its tube scarcely longer than the calyx, its limb 4--6 mm. wide, the anterior lobe retuse; cocci cylindric-trigonous, 2--2.5 mm. long, shallowly scrobiculate above, changing to indefinitely striate toward the base, the commissural faces finely muricate-scabrous to practically smooth, not reaching the tip of the coccus; chromosome number: n = 7.

The type of this species was collected by Samuel Mills Tracy and Franklin Sumner Earle (no. 30) at Barstow, Ward County, Texas, on April 14, 1902. The specimen on which V. cinerea is based seems to be J. Reverchon s.n., collected on August 9, 1877, in Comanche County, Texas, and is deposited in the herbarium of Barnard College at the New York Botanical Garden. It seems certain that this is an error in transcription for V. canescens H.B.K.

In Texas V. plicata is said to occur chiefly in open sandy ground, flats, prairies, and ravines, and along roadsides, frequent on gravel hills, widespread in northern, central, and southern portions of the state from Childress and Young to Gonzalez and Cameron, west to Zapata, Brewster, and Jeff Davis Counties. Collectors have found it in stony or rocky soil, in sandy or dry sandy soil, limestone or fairly well-packed reddish sandy soil, igneous or dry clay-loam soil, in sand or brickred-colored loose sand, coarse sand and sandy loam, sandy red soil, red sand over gypsum, red Permian shale, interfan alluvium, fine sandy loam or brownish sandy-loam soil, orange-colored sandy loam or light-gray calcareous soil, gravelly calcareous soil of the type known as Reeves Gravelly Loam, sandy loam soil over caliche, clay or black clay soil, loam, wet sand, or sandy loam, and hardpan soil. It grows in deposits of deep sand at the edge of woods, in mesquite grasslands, ungrazed pastures, mixed prairie grasslands, in dry or open sandy ground, dry calcareous open ground, and open or dry open ground in general, in brushlands, clearings in brush, thick brush, pastures, oak areas, depressions, and wet ravines. It occurs on cliffs and gypsum bluffs, road shoulders, plains and brushy or high rocky plains, sand dunes, banks, rough, rocky, or dry rocky hillsides, sandy ridges among large yuccas, Prosopis-Condalia flats, open hillsides and flats, and on the sandy bottoms of floodplains. One is apt to encounter it among brush on sand-

stone ridges, along rivers and roadsides, and near irrigation ditches, at altitudes of 30 to 5400 feet, flowering and fruiting from February to October.

Benson states that V. plicata is a component of the Desert Grassland vegetation type in Arizona. Waterfall reports it from "gravelly soil in Larrea-Prosopis-Gutierrezia association" in Reeves County, Texas, and in "silty soil in valley between gypsum ridges" in Oklahoma. Cory reports it as "frequent on roadsides" in Ward County. Brown calls it a "rare perennial in pasture" in Brewster County, while Hanson avers that it is "frequent on rocky slopes" in that county. Scudday asserts that it is found "throughout" Andrews County in low places, Pammel says that it is "common on prairies" in Starr County, while Muller asserts it to be "common on red sandy prairies" in Frio County.

According to Runyon, it is "abundant in the Beeville region" of Bee County, Texas, and "frequent in Hidalgo and Starr Counties on the gravel hills"; he also states "flowers in terminal racemes, rare in the region near Brownsville, prefers sandy soil". Actually, of course, the flowers are in spikes, not racemes. Warnock refers to the species as "infrequent in red igneous soil" in Brewster County and "infrequent to frequent perennial herb in limestone soil" in Crane County; he and McBryde refer to it as a "frequent perennial" in Crockett County. In Burnet County it was found by Lathrop in sandy soil of a rocky gully in granite outcrops on the slopes with Juniperus, Yucca, and Opuntia. According to Johnston, it is a "frequent annual" or "infrequent in dry sandy loam associated with V. bipinnatifida, Sorghum halepense, and Triodia albescens" in Webb County, while Warnock & Mullins refer to it as "infrequent" in Crane County. Jones, Rowell, & Johnston (1961) say that it grows in pasture openings on well-drained sandy or clayey loams and caliche, flowering in spring and summer. In Shreve & Wiggins (1964) it is stated that V. plicata grows "In open sandy ground, flats, prairies, and ravines, along roadsides, and frequent on slopes of gravel hills and cliffs, Lower and Upper Sonoran Zones, from the vicinity of Tucson, Arizona, to Texas and Nuevo León."

Specimens of V. plicata have been misidentified and distributed in herbaria under the names V. bipinnatifida Nutt., V. bracteata Lag. & Rodr., V. bracteosa var. brevibracteata Gray, V. canescens Kunth, V. canescens H.B.K., V. canescens var. roemeriana (Scheele) Perry, V. caroliniensis (Walt.) J. F. Gmel., V. cauescens var. roemeriaua (Scheele) Perry, V. cloveri Moldenke, V. cloveri var. lilacina Moldenke, V. gracilis Desf., V. halei Small, V. neomexicana Small, V. neo mexicana (Gray) Small, V. neo-mexicana (A. Gray) Small, V. neomexicana var. hirtella Perry, V. perennis Wooton, V. plicata var. degeneri Moldenke, V. polystachys H.B.K., and V. xutha Lehm. As an example of the confusion attending this species in herbaria, Croft s.n. [San Diego, 1885] was determined, in sequence, as V. canescens H.B.K., V.

canescens var. neo-mexicana A. Gray, V. neomexicana (A. Gray) Small, V. neo-mexicana Briq., V. remota Benth., and V. remota var. hirsuta (Torr.) Farwell!

On the other hand, the Tharp 43-800, 43-801, 43-802, & 43-893b, distributed as V. plicata, are actually var. degeneri Moldenke; Waterfall 15325 is V. canescens H.B.K.; S. E. Wolff 539 is V. canescens var. roemeriana (Scheele) Perry; L. C. Taylor 3033 is V. halei Small; Waterfall 5143 and Waterfall & Wallis 13342 are V. neomexicana var. hirtella Perry; and Parks & Cory 14747 is Heliotropium sp. in the Heliotropiaceae. Arsène 18885 is a mixture with V. bracteata Lag. & Rodr.; J. Reverchon 737 and B. H. Warnock s.n. [May 3, 1937] are mixtures with V. canescens var. roemeriana; Tharp 43-800 is a mixture with V. canescens var. roemeriana and with V. plicata var. degeneri; Wagner & Barkley 16T322 is a mixture with V. halei Small; and B. H. Warnock 20436 and Wiggins 4360 are mixtures with V. neomexicana var. hirtella Perry.

The Bogusch s.n. [Spring 1926], cited below from Bexar County, Texas, may actually have been collected in Wilson County — both county names appear on the label; Ecology Class Univ. Texas s.n. [2.28.30] and s.n. [2.29.30], cited below under Webb County, may have come from Zapata County — the labels are inscribed "Laredo—Zapata". The record of V. plicata from Yavapai County, Arizona, appearing in some of my previous publications, was based on some specimens of Toumey 306, but according to the best available information this collection was actually made at Tucson, in Pima County, on May 2, 1892. E. W. Lathrop 2075 is a mixture with V. canescens var. roemeriana.

Perry (1933) cites the following 43 additional specimens not as yet seen by me: TEXAS: Blanco Co.: E. J. Palmer 13282 (E). Brewster Co.: H. C. Hanson 619 (E); Moore & Steyermark 3299 (E); E. J. Palmer 30523 (E). Comanche Co.: Eggert s.n. [near Comanche, 10 May 1900] (E, G); J. Reverchon 834, in part (E). Hall Co.: J. Reverchon 4314 (E). Hidalgo Co.: McKelvey 1756 (G). Jeff Davis Co.: Ferris & Duncan 2726 (E). Martin Co.: Eggert s.n. [north of Stanton, 13 June 1900] (E). Mitchell Co.: Eggert s.n. [north of Colorado, June 1900] (E, G). Nolan Co.: E. J. Palmer 13730 (E). Nueces Co.: Edw. Palmer 2038 (G). Terrell Co.: E. J. Palmer 33537 (E). Tom Green Co.: J. Reverchon 1953 (E). Travis Co.: E. Hall 429 (F, G). Val Verde Co.: Orcutt 6235 (E). Ward Co.: Tracy & Earle 30 (E—isotype, F--isotype, G—isotype). Webb Co.: Berlandier 1485 [225], in part (G); Orcutt 5555 (E), 5717 (E); Edw. Palmer 2040 (G); J. Reverchon 3904 (E, G). County undetermined: Berlandier 644 (E), 2506, in part (E); J. Reverchon 118 (G); C. Wright 1496 (E, G). NEW MEXICO: Dona Ana Co.: Fendler 594 (E, G). ARIZONA: Cochise Co.: Pringle s.n. [Camp Lowell, June 8, 1882] (D, F). Pima Co.: Bartram 256 (D); Greenman &

Greenman 28 (E); Pringle s.n. [near Pantano, June 14, 1881] (E, F, G). She says: "In habit V. plicata is somewhat similar to V. neomexicana, but in inflorescence it strongly resembles V. canescens var. roemeriana. Its distinctive character is foliar and is most easily seen in the basal and lower stem-leaves. The leaf is obviously petioled, often 3-lobed, and very shallowly incised-dentate; moreover, the veins beneath are whitish and particularly prominent near the margin owing to the plication of the leaf and the apparent broadening of the veins in this region." The C. Wright 1496 collection which she cites from Texas, is cited by me below as from New Mexico, as is stated on the label. It may well be, however, that what Wright regarded as part of Texas is now New Mexico, or vice versa.

In all, 343 herbarium specimens, including the type material of all the names involved, and 2 mounted photographs have been examined by me.

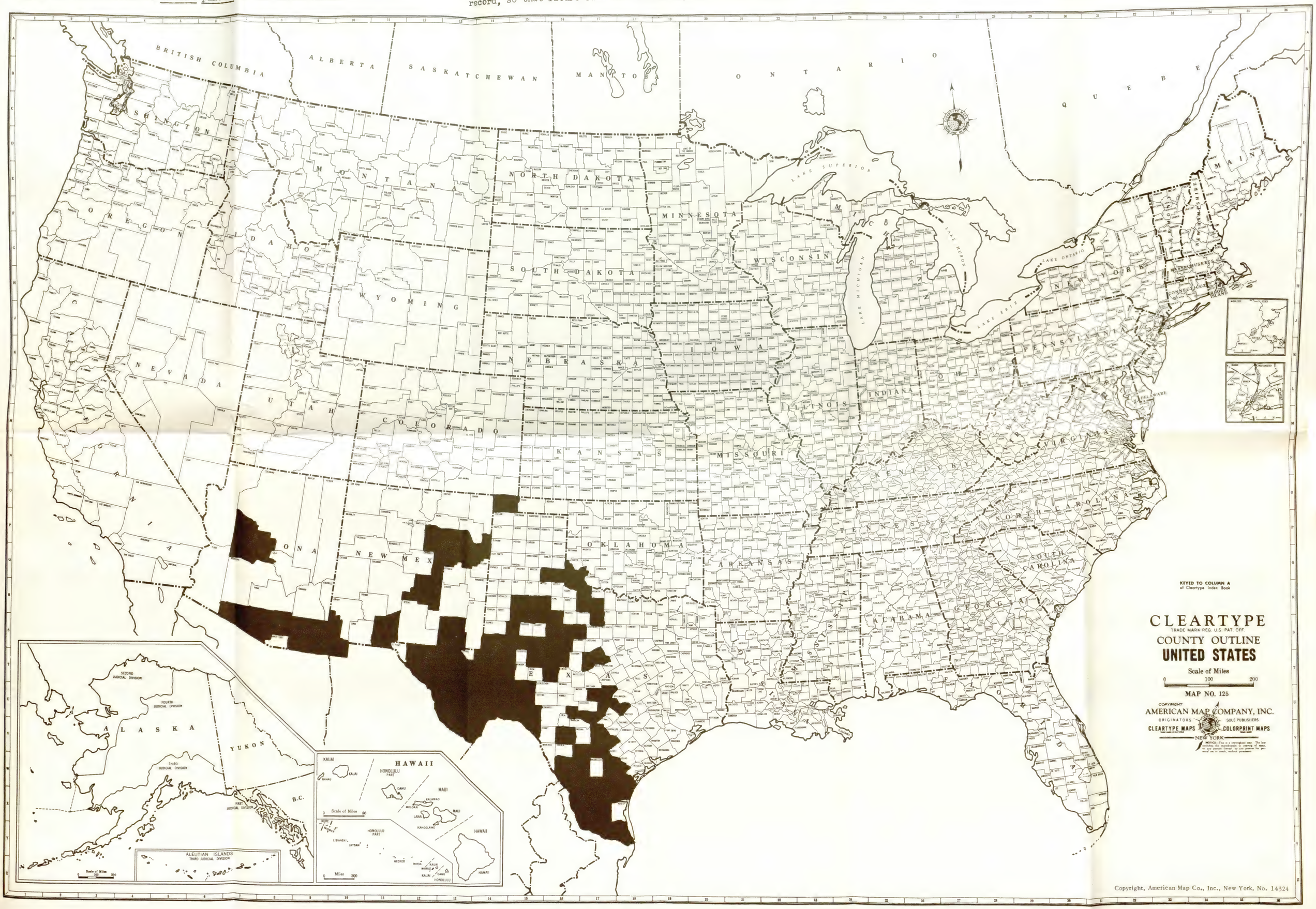
Citations: OKLAHOMA: Cimarron Co.: C. M. Rogers 5990 (Au—122466, Ok, W—2053132); Waterfall 8663 (Ok, St). Harmon Co.: Waterfall 8347 (Ok), 8979 (Ok). Jackson Co.: W. S. Myers 751 (Ok); Waterfall 9437 (St, St), 11980 (Au—122465, Go, Ok, St, W—2231137). TEXAS: Andrews Co.: Lundell & Lundell 11406 (Rf, Sm); Scudday s.n. [5/4/59] (Ld). Archer Co.: Vollum s.n. [Fort Belknap, 1855] (W—56211). Atascosa Co.: E. J. Palmer 9767 (Bi, Du-205612, S, W—1531981). Baylor Co.: Bridge s.n. [near Seymour, 6/16] (Cn). Bee Co.: R. Runyon 2188 (Rr); Wolcott & Barkley 16T420 (Au). Bexar Co.: Bogusch s.n. [Bexar & Wilson Counties, Spring 1926] (Ob—86215); Metz 557 (I), 2156 (Se—57943), 2478 (S). Blanco Co.: E. J. Palmer 13282 (B, W—1603459). Brewster Co.: G. W. Brown B.102 (N); Cory 43929 (Au); H. C. Hanson 619 (N, W—982949); A. R. Moldenke 169 (Fg); Moore & Steyermark 3299 (Ca—471365); Parks & Cory 9146 (Tr), 9296 (Tr), 9297 (Tr); Rose-Innes & Moon 1169 (Au); Steiger 583 (N), 2038 (N); Tharp 253 (N); B. H. Warnock 4600/5644 (Au—122421), 20436, in part (Au), 20437 (Au), 21230 (Au), s.n. [May 3, 1937] (Au). Brooks Co.: C. L. Lundell 10819 (N, Rf), 10827 (N, Rf); Parks & Cory 14209 (Tr). Brown Co.: J. Reverchon 737, in part (W). Burnet Co.: E. W. Lathrop 2075, in part (Lw). Cameron Co.: C. L. Lundell 10702, in part (Sm), 10779 (Sm); R. Runyon 2463 (N, N, N, N). Childress Co.: Biology Class Childress High School 19 (Au). Coke Co.: Parks & Cory 12889 (Tr—16188), 13891 (Tr—16179). Comanche Co.: J. Reverchon s.n. [Aug. 9, 1877] (Bc). Crane Co.: Lundell & Lundell 10232 (Ld, N); B. H. Warnock 14656 (Au—123220, Rf); Warnock & Mullins 14405 (Au—198214, Rf). Crockett Co.: M. E. Jones 26221 (Po—178340); Warnock & McBryde 15316 (Au—123207, Rf). Crosby Co.: J. D. Graham s.n. [June 11, 1960] (Au—181482). Culberson Co.: Waterfall 4171 (N, Ok, St), 5172 (Au, Gg—316102, N,

Ok). Dawson Co.: Herb. Texas Soil Survey s.n. [6-25-1922] (Tr). Dickens Co.: Cory 13618 (Md); Parks & Cory 13618 (Tr—16186). Dimmit Co.: D. S. Correll 20736 (Rf); Johnston, Tharp, & Turner 3534 (Au—122438). Duval Co.: Croft 79 (C, Pa), s.n. [San Diego, 1885] (Mi). Ector Co.: Lundell & Lundell 11403 (N, Rf); Tharp s.n. [7/10/41] (Au). Fisher Co.: Booker 29 (Au, Au), s.n. [Rotan] (Au); T. M. Shepherd s.n. [Ray's pasture, Grady, Apr. 7, 1901] (W—413926). Frio Co.: R. Bebb s.n. [Dilley, Apr. 28, 1905] (Ok); Cory 12755 (Md); Ecology Class Univ. Texas s.n. [Dilley, 2.27.30] (Au); Lucas, Painter, & Barkley 11427 (Au, Ok, S); C. L. Lundell 13620 (Sm); C. H. Muller 2612 (Ca—719584, Rf); Tharp s.n. [Dilley, 2-27-30] (Ca—882790). Garza Co.: F. W. Pennell 10528 (N); Ruth 1289 (Au—122439, Mi, W—1243556), 1421 (Mg—65, W—1287488); Wooton s.n. [Post, May 22, 1925] (W—1244639). Hardeman Co.: C. R. Ball 1171 (W—501646). Hidalgo Co.: Lundell & Lundell 9820 (Ld, N), 10038 (Ld, N, W—1888884), 10069 (Ld, N); McKelvey 1756 (W—1581391); Tharp & York 51-259 (Au—122450, St); B. L. Turner 4495 (Au—168768); Mrs. E. J. Walker s.n. [2/9/42] (Au, Au). Howard Co.: Parks & Cory 12888 (Tr—16180). Hudspeth Co.: Tharp 43-804 (Au, Ca—882666); Waterfall 5348 (N). Jeff Davis Co.: C. C. Albers 46259 (Au, N); Ferris & Duncan 2726 (Ba, Du—125421, Gg—31272, N, Po—126881); Parks & Cory 18456 (Tr—16183); B. H. Warnock 4800/5671 (Au—122420); M. S. Young s.n. [Davis Mtns., 9/5/18] (Po—161332). Jim Hogg Co.: M. C. Johnston 54118 (Au—122433); Tharp & Johnston 542036 (Au—122411); Tharp, Johnson, & Webster 48-70 (N). Jim Wells Co.: F. B. Jones 2982 (Ww); E. J. Palmer 11257 (Au—122434, Ca—425607); Wagner & Barkley 16T322, in part (Au, N). Jones Co.: N. C. Henderson 63-141 (Au—217614). Kendall Co.: Metz 170 (I). Kent Co.: Correll & Johnston 22106 (Ld). Kerr Co.: F. W. Pennell 10387 (N). Kleberg Co.: E. R. Bogusch S.62 (W—2003648); S. F. Sinclair s.n. [Kingsville, Spring 1940] (Au); S. M. Tracy s.n. [Kingsville, 4/10/05] (Tr). LaSalle Co.: Winch 6 (Ok). Live Oak Co.: E. D. Schulz s.n. [4/22/1938] (Wi). Llano Co.: Wolff 3908 (Tr—16163). Lubbock Co.: Demaree 7539 (Du—205667, W—1469003); Tharp s.n. [Yellow Hand Canyon, 5/1/34] (Au, Au). Lynn Co.: Moldenke & Woods 599 (S), 600 (S). Midland Co.: Cory 42034 (Au); Lundell & Lundell 10260 (Ld, N); Parks & Cory 12480 (Tr—16181). Mitchell Co.: Cory 48041 (Au, N); C. L. Lundell 11375 (Rf); Lundell & Lundell 11375 (N); R. W. Pohl 4360 (Sm), 4723 (Sm), 4845 (Sm), 5105 (Sm). Nolan Co.: E. J. Palmer 13730 (B, W—16034581). Pecos Co.: Lundell & Lundell 10197 (Ld, N), 10204 (Ld, N, W—1888893); B. H. Warnock 47 (W—1730931), 46122 (Au, N, Ok). Presidio Co.: C. L. York 48164 (St). Reeves Co.: Correll & Johnston 22034 (Ld); A. R.

Figure 13. Distribution of Verbena plicata in the United States

Herbarium curators who have material of this species from additional counties are asked to send it to the author for verification and record, so that future editions of this map may be more complete

Mapping by counties done by Andrew R. Moldenke



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CLEARTYPE
TRADE MARK REG. U.S. PAT. OFF.
COUNTY OUTLINE
UNITED STATES
Scale of Miles
0 100 200
MAP NO. 125

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Moldenke 643 (S); Parks & Cory 18457 (Tr--16184); Roane 30 (Ar--256370); Waterfall 4231 (St, Tu--128475). Runnels Co.: J. C. Johnson 663 (Au--122452). San Patricio Co.: F. B. Jones 1810 (Ww). Shackelford Co.: Rohrbaugh 473 (Z). Starr Co.: Alvarez, Guajardo, Salazar, & McCart 7923 (Ok); Lundell & Lundell 9788 (Ld, N); McCart 7227 (Ok); C. L. Pammel s.n. [Rio Grande City, 2-28-29] (Io--134124); R. Runyon 2560 (N); Tharp & York 51-134 (Au-122431, St). Sterling Co.: R. W. Pohl 4790 (Sm). Stonewall Co.: V. L. Harms 1752 (Lw). Taylor Co.: J. F. Brenckle 48079 (N); Mahler 1353 (St); Tolstead 7103 [Herb. Tex. Agr. Exp. Sta. 41986] (Au), 7200 (N). Terrell Co.: E. J. Palmer 33537 (N), 33567 (N); Warnock & Turner 600 (Rf). Tom Green Co.: E. J. Palmer 12382 (Ca--425603), 12383 (Au--122423); C. Smith 143x (Ok). Travis Co.: Armer 5380 (Au, Au, Au, Au, W--1438994); E. Hall 429 (N, Pa, W); Tharp s.n. [Austin, 5-16-39] (Gg--316100, Mi). Uvalde Co.: C. L. Lundell 10966 (Sm). Upton Co.: Cory 53475 (N); Lundell & Lundell 10223 (Ld, N, W--1888902). Val Verde Co.: Cory 39090 (N, N); G. L. Fisher 282 (W--1119184). Ward Co.: Cory 51970 (N, W--1946393); Earle & Tracy 41 (N); Lundell & Lundell 11381 (Ld, Sm); E. L. Reed 1922 (W--1488976); Tracy & Earle 30 (Au--isotype, Cm--isotype, Es--isotype, N--isotype, N--isotype, N--photo of isotype, Tr--8125--isotype, W--441779--isotype, Z--photo of isotype). Webb Co.: Acle & Guerrero 158 (Ok); J. Baird s.n. [Laredo, June 11, 1960] (Au--181924); Blair & al. 48-487 (Au--122455); Cantu, Chapa, & McCart 18 (Ok); M. E. Drake 32 (Ok, Ok); Ecology Class Univ. Texas s.n. [Laredo--Zapata, 2.28.30] (Au, Au), s.n. [2.29.30] (Au); H. J. Hamby 545 (Ar--206671); M. C. Johnston 3801 (Au--169773); Lewis & Oliver 5411 (Nb); Lundell & Lundell 10106 (Ld, N); K. K. Mackenzie 95 (Dt, N); McCart 7163 (Ok), 7288 (Ok); J. Reverchon 3904 (W--969776); Tharp s.n. [3-15-31] (N). Wilbarger Co.: Whitehouse 10931 (Sm). Willacy Co.: Lewis & Oliver 5423 (Nb). Winkler Co.: Lundell & Lundell 11393 (N, Rf). Young Co.: B. B. Harris s.n. [5-2-31] (N), s.n. [5-10-31] (Nt); Hayes 608 (Du--177390, Ms, N); McCart 860 (Nt); Whitehouse 15341 (Mi, N). Zapata Co.: Cantu & McCart 36 (Ok); Cory 28133 (N); Herrera & McCart 7698 (Ok); Lundell & Lundell 10109 (Ld, N); McCart 7205 (Ok); Ramos, Sandoval, Salazar, & McCart 7847 (Ok); Tharp & Johnston 541936 (Au--122352). County undetermined: Berlandier 644 (T); Havard s.n. [Pecos River, Sept. 1881] (W--218870); "L. A." s.n. [4.2.29] (Au); E. L. Reed 3391 [Posey Canyon] (W--1184334); Winans s.n. [Central Texas, 5-27 & 28-1932] (Mi, N); C. Wright 253 (Au--121974); M. S. Young s.n. [Colorado River banks near Sandy Creek, 4/22/15] (Au). NEW MEXICO: Eddy Co.: C. C. Albers 46289 (Au). Guadalupe Co.: A. R. Moldenke 127 (Fg). Hidalgo Co.: A. R. Moldenke 142 (Am); E. Ordway s.n. [Rodeo, August 6,

1955] (Am). Lincoln Co.: F. S. Earle 427 (W--480899), 606 (N); Earle & Earle 427 (N). Quay Co.: A. R. Moldenke 124 (Fg). San Miguel Co.: Arsène 18885, in part (Po--148523). County undetermined: W. B. Pease s.n. [New Mexico, 1878] (W--147570); C. Wright 1496 (Ca--248341, T). ARIZONA: Cochise Co.: Benson 11369 (Po--267650); Griffiths 1595 (N); Pringle 4829 (N), s.n. [Camp Lowell, June 8, 1882] (Al, Br, C, Cm), s.n. [valley near Camp Lowell, 1882] (Sg--68316). Pima Co.: Pringle s.n. [Santa Catalina Mts., April 13, 1881] (Ll), s.n. [near Pantano, June 14, 1881] (Pa, Up-17099, Vt); Smart 352 (W--56210); J. J. Thornber s.n. [July 21, 1901] (Tu), s.n. [May 11, 1903] (Tu); Toumey 306 (Du--90894, Tu, W--212335). MEXICO: Baja California: Wiggins 4360 (Du--259476, W--1739752). Chihuahua: M. E. Jones s.n. [Colonia Juarez, Sept. 11, 1903] (Po--71250). Coahuila: M. E. Jones 372 (Po, W--237975); E. G. Marsh 1133 (St); S. S. White 1994 (Mi). Nuevo León: Frye & Frye 2392 (Se--65713). Sonora: Wiggins 11783 (Du--346447, W--2264373). Tamaulipas: Lewis & Oliver 5412 (Nb). State undetermined: W. W. Jones s.n. [Agua Prieta, 4/17/44] (Or--52101).

VERBENA PLICATA var. DEGENERI Moldenke, Phytologia 2: 24--25.1941.

Bibliography: Moldenke, Phytologia 2: 24--25. 1941; Moldenke in Lundell, Fl. Texas 3 (1): 17 & 29. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 13 & 102. 1942; Moldenke, Phytologia 2: 164. 1946; Moldenke, Alph. List Cit. 1: 154. 1946; H. N. & A. L. Moldenke, Pl. Life 2: 55. 1948; Moldenke, Wrightia 1: 227. 1948; Moldenke, Alph. List Cit. 3: 795 & 914 (1949) and 4: 989. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 24 & 199. 1949; Moldenke, Résumé 29 & 473. 1959.

This variety differs from the typical form of the species in its bractlets being very firm and rigid, dry, stramineous, broadly ovate, to 9 mm. long and 6 mm. wide, and very abruptly acuminate at the apex.

The type of the variety was collected by my very good friend and colleague, Otto Degener (no. 5184) -- in whose honor it is named -- near Fort Stockton, Pecos County, Texas, on August 2, 1933, and is deposited in the Britton Herbarium at the New York Botanical Garden.

The variety has been found in dry desert land, mesa margins, valleys, mesquite valleys, Flourensia flats, and railroad rights-of-way, in two counties of western Texas, where it appears to be endemic, flowering and fruiting from June to August. It is not a very well marked variety and may prove to be merely an edaphic variant due to the rigorous environment in which it lives.

Material has been misidentified and distributed in herbaria under the names V. canescens H.B.K., V. cauesceus H.B.K., V. cauesceus var. roemeriaua (Scheele) Perry, V. neomexicana (A. Gray) Small, V. neo-mexicana (A. Gray) Small, and V. plicata Greene.

In all, 16 herbarium specimens, including the type, and one mounted clipping have been examined by me.

Citations: TEXAS: Brewster Co.: H. B. Parks 3096 (Wi); E. D. Schulz 2026 (N, Wi, Wi). Pecos Co.: O. Degener 5184 (N--type); Tharp 43-799 (Au), 43-800 (Au--122454, N), 43-801 (Au, Ca--882625, N, W--1888992), 43-802 (Au, N), 43-803 (Au), 43-893b (N). MOUNTED CLIPPINGS: Phytologia 2: 24--25. 1941 (W).

VERBENA POGOSTOMA Klotzsch ex Walp., Repert. 4: 31. 1845.

Synonymy: Verbena pogonostoma Klotzsch ex Schau. in A. DC., Prodr. 11: 550. 1847.

Bibliography: Walp., Repert. 4: 31. 1845; Schau. in A. DC., Prodr. 11: 550 & 553. 1847; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 148. 1894; Jacks., Ind. Kew. 2: 1179. 1895; Hayek in Engl., Bot. Jahrb. 42: 165. 1908; Hicken, Chlor. Plat. Argent. 198. 1910; Moldenke, Suppl. List Invalid Names 10. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 44, 74, & 102. 1942; Moldenke, Alph. List Invalid Names 49. 1942; Moldenke, Alph. List Cit. 1: 96 (1946) and 2: 359 & 442 (1948), and 3: 688. 1949; Moldenke, Phytologia 3: 136. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 106, 164, & 199. 1949; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; Moldenke, Résumé 128, 224, 372, & 473. 1959; Moldenke, Résumé Suppl. 3: 15. 1962; Moldenke, Phytologia 9: 15. 1963.

Perennial, perhaps suffrutescent at the base, diffuse, grayish-subcanescent throughout; branches hirtellous-pubescent; leaves sessile; leaf-blades about 4 cm. long, tripartite, cuneate at the base, strigose-hispidulous above and on the venation beneath, the segments narrow, pinnatifid-incised and dentate above, the laciniations linear-lanceolate, acute, revolute-margined, the lower ones entire and 2 mm. wide; spikes terminal and axillary, fastigiate, short-pedunculate, dense-flowered, strigose-hirtellous and glanduliferous, greatly elongate during anthesis, eventually becoming 15 cm. long, the flowers always imbricate; bractlets lanceolate-subulate, half as long as the calyx; calyx about 6 mm. long, about equaling the corolla-tube, colored, substrigose-pubescent with non-spreading hairs, the rim 5-fid, the teeth unequal, subulate-attenuate from a lanceolate base; corolla-tube infundibular, scarcely surpassing the calyx, gradually widened from the base to the yellow throat, barbate at the mouth, the limb medium in size, blue, the lobes short, rounded; fruit half as long as the fruiting-calyx, the cocci reticulate on the back.

This species was apparently based on several collections made from plants cultivated at the botanical garden in Berlin, Germany, and collected there in October, 1839, and August, 1843, and deposited in that herbarium, where they were photographed by Macbride as his type photograph 17440, but are now destroyed. Schauer, in 1847, states that he saw plants of this species still growing in that garden. Macbride's photograph of the Berlin cotypes is inscribed "Peru" on its label, but this is certainly an error, since the seeds originated in Buenos Aires, Argentina. Schauer says "Semina e Bonaria fuisse allata ferunt; ex affinitate typi tamen regnum Mexicanum patriam autumaverim. Mire similis V. cil-

iatae, vero tamen distincta pube, fol. laciniis magis elongatis, corolla et antheris super. omnis vestigio appendicis carentibus." He refers to the fruit as a capsule.

In Chittenden's "Dictionary" this species is said to be "very similar to V. diffusa, but differing in having the calyx-pubescence substrigose, not wide-spreading." Verbena diffusa, however, is a synonym of V. urticifolia L., with which our plant has no close resemblance whatever. Probably V. dissecta Willd. is intended.

Walpers (1845) classifies V. pogostoma in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Macranthae, and Secondary Subgroup Aubletia, along with ten other species. It was introduced into cultivation in or before 1839. A common name for it is "Argentine verbena". It has been collected in anthesis in August and from October to December.

In all, 4 herbarium specimens and 6 mounted photographs, including photographs of the cotypes of both names involved, have been examined by me.

Citations: ARGENTINA: La Rioja: Castellanos s.n. [Herb. Mus. Argent. Cienc. Nat. 33885] (N). San Juan: Cuezzo 2255 (N). Santa Fé: Balegno 824 (N). Tucumán: Varela s.n. [22.IV.1944] (Ca--165879). CULTIVATED: Germany: Herb. Hort. Bot. Berol. s.n. [Oct. 1839; Macbride photos 17440, in part] (Kr--photo of cotype, N--photo of cotype, N--photo of cotype), s.n. [Aug. 1843; Macbride photos 17440, in part] (Kr--photo of cotype, N--photo of cotype, N--photo of cotype).

VERBENA PORRIGENS R. A. Phil., Linnaea 33: 195. 1864.

Synonymy: Verbena porrigenes R. A. Phil. ex Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42, sphalm. 1942.

Bibliography: R. A. Phil., Linnaea 33: 195. 1864; F. Phil., Cat. Pl. Vasc. Chil. 221. 1881; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42 & 102. 1942; Moldenke, Lilloa 10: 345. 1944; Moldenke, Alph. List Invalid Names Suppl. 1: 26. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 102 & 199. 1949; Moldenke, Alph. List Cit. 3: 688, 813, & 940. 1949; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 59. 1951; Moldenke, Résumé 122, 372, & 473. 1959; Muñoz Pizarro, Espec. Plant. Descr. Philippi 111. 1960; Moldenke, Résumé Suppl. 4: 5. 1962; Moldenke, Phytologia 8: 192 & 204 (1962) and 10: 298 & 299. 1964.

Suffrutescent, canescent-hispidulous with short white spreading hairs throughout; stems several, rising from a woody base, erect or ascending, 15--45 cm. long; leaves decussate-opposite, the larger ones about 1.6 cm. long and almost as wide, multipartite, strigose, with 2 or 3 lobes on each side, the lower ones only 2- or 3-lobed, the rest entire, all the lobes linear, obtuse or rounded at the apex, revolute-margined, densely covered with appressed white hairs; peduncles 1.4--5 cm. long; inflorescence capitate, later elongating; bractlets lanceolate, about 3.5 mm.

long or half as long as the calyx; calyx about 5 mm. long, hispid; corolla rose, its tube 8 mm. long; anther-appendages clavate, exserted.

The type of this little-known species was collected by Christian Ludwig Landbeck near Quilimari, Aconcagua, Chile, in December, 1861, and is deposited in the herbarium of the Museo Nacional de Historia Natural at Santiago. The Macbride photograph of an isotype in the Berlin herbarium, now destroyed, is inscribed on its label as though the collection were one of Philippi's, but the best evidence seems to point to Landbeck as the collector. Philippi says: "Unica species chilensis antherarum appendicibus clavatis, exsertis munita, quae antea innotuit, est V. sulphurea Sweet, quae colore floris, colore viridi foliorum, eorumque laciniis longioribus, angustioribus primo adspectu differt." The Skottsberg & Skottsberg 843, sometimes regarded as representing V. porrigens, is actually V. sulphurea D. Don.

Acevedo de Vargas (1951) cites the following 4 specimens not as yet seen by me: CHILE: Aconcagua: Landbeck s.n. [near Quilimari, XII.1861] (Sg--54729--type). Coquimbo: Reiche s.n. [Los Vilos, I.1899] (Sg--68380), s.n. [IX.1905] (Sg--54730). Valparaíso: Collector undesignated s.n. [Quillota] (Sg--42478).

In all, one herbarium specimen and 4 mounted photographs, including photographs of the types of both names involved, have been examined by me.

Citations: CHILE: Aconcagua: Landbeck s.n. [near Quilimari, Dec. 1861; Herb. Mus. Nac. Hist. Nat. Chile 54729; Macbride photos 17441] (Kr--photo of isotype, N--photo of type, N--photo of isotype, N--photo of isotype). Coquimbo: Herb. Mus. Nac. Santiago 14 (N).

xVERBENA PROSTIBULA Moldenke, Phytologia 5: 133. 1955.

Synonymy: Verbena hispida x simplex Dermen, Cytologia 7: 170. 1936. Verbena hispida Ruíz & Pav. x V. simplex Lehm. ex Moldenke, Résumé 366, in syn. 1959. Verbena simplex Lehm. x V. hispida Ruíz & Pav. ex Moldenke, Résumé 374, in syn. 1959.

Bibliography: Dermen, Cytologia 7: 170. 1936; Moldenke, Phytologia 3: 467 (1951) and 5: 133. 1955; Moldenke, Biol. Abstr. 30: 1093. 1956; Moldenke, Am. Midl. Nat. 59: 359. 1958; Moldenke, Résumé 224, 366, 374, & 473. 1959; Moldenke, Phytologia 8: 121 (1961) and 9: 296. 1963.

This is the hybrid between V. hispida Ruíz & Pav. and V. simplex Lehm., produced artificially by Dermen in Massachusetts and described by him in 1936. Since these two species do not grow in the wild together anywhere, as far as I am aware, there is little chance of ever finding this hybrid in Nature. Both species, however, occur in cultivation -- especially in Europe -- and the hybrid might have horticultural possibilities.

VERBENA PULCHELLA Sweet, Brit. Flow. Gard., ser. 1, 3: pl. 295. 1829 [not V. pulchella Greene, 1903].

Synonymy: Shuttleworthia pulchella Meisn., Pl. Vasc. Gen. 198. 1839. Shuttelworthia pulchella Meisn. ex Steud., Nom. Bot., ed. 2, 2: 575. 1841. Verbena pulchella Hort. ex Steud., Nom. Bot., ed. 2, 2: 750, in syn. 1841. Schuttleworthia pulchella Meisn. ex Morren, Belg. Hort. 20: 111, in syn. 1870. Verbena pulchella Spreng. ex Regel, Gartenfl. 28: 372. 1879. Verbena laciniata var. albida Herter ex Moldenke, Suppl. List Invalid Names 9, in syn. 1941. Schuttelworthia pulchella Meisn. ex Moldenke, Alph. List Invalid Names Suppl. 1: 19, in syn. 1947. Verbena pulcherrima Harvey ex Moldenke, Alph. List Invalid Names Suppl. 1: 26, in syn. 1947 [not V. pulcherrima Vilm., 1865].

Bibliography: Sweet, Brit. Flow. Gard. 3: pl. 295. 1829; Lodd., Bot. Cab. 16: pl. 1550. 1829; Maund, Bot. Gard. 3: pl. 70. 1829--1830; Sweet, Hort. Brit., ed. 2, 418. 1830; Reider, Ann. Blumisterei 7: 291--292 (1831) and 8: [pl. 12]. 1832; G. Don in Loud., Hort. Brit. Suppl. 2: 680. 1839; Meisn., Fl. Vasc. Gen. 198. 1839; Walp., Repert. 4: 13 & 34. 1845; Payer, Organog. Comp. Fl. pl. 115. 1857; Bocq., Adansonia 2: 106, 107, 131, & 132. 1861-1862; Bocq., Rev. Verbenac. 26, 27, 51, & 52. 1862; Vilm., Fl. Pl. Terre, ed. 1, 937--938. 1865; Morren, Belg. Hort. 20: 111--112. 1870; Ulrich, Internat. Wörterb. Pfl., ed. 1, 250. 1872; Rümpler in Vilm., Illustr. Blumeng., ed. 1, 1261--1262. 1873; Ulrich, Internat. Wörterb. Pfl., ed. 2, 250. 1875; Vilm., Alb. de Cliches, ed. 2, fig. 25680. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 895 & 1179. 1895; L. H. Bailey in A. Gray, Field Forest & Gard. Bot. 341. 1895; Haage & Schmidt, Cat. Général 93, no. 5920. 1898; Ed. Rodigas, Bull. Arboricult. Belg. 1902: 113. 1902; Briq., Ann. Conserv. & Jard. Bot. Genèv. 7-8: 297. 1904; Stapf, Ind. Lond. 6: 431. 1931; Grey & Hubbard, List Pl. Bot. Gard. Atkins Inst. 204. 1933; L. H. & E. Z. Bailey, Hortus, new rev. ed., 631 & 632. 1935; Herter, Revist. Sudam. Bot. 4: 186--187. 1937; Moldenke, Cult. Pl. 35. 1938; Moldenke, Annot. & Classif. List 108. 1939; Moldenke, Suppl. List Invalid Names 9. 1941; Moldenke, Alph. List Invalid Names 48. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 41, 44, 74, & 102. 1942; Moldenke in Lundell, Fl. Texas 3 (1): 44. 1942; Rosengurtt, Estud. Prad. Nat. Urug. 4: 8. 1944; E. L. D. Seymour, New Gard. Encycl. 1279. 1944; Augusto, Fl. Rio Grande do Sul 218, fig. 104. 1946; Moldenke, Alph. List Cit. 1: 84, 129, 212, & 219 (1946) and 2: 357, 358, 458, 532, 533, 565, 575, 579, & 620. 1948; Neal, In Gard. Hawaii 636. 1948; Moldenke, Castanea 13: 119. 1948; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 14. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 89, 94, 100, 106, 164, & 199. 1949; Moldenke, Alph. List Cit. 3: 671, 766, 780, 781, 798, 861, 874, 911, & 949 (1949) and 4: 1010 & 1233. 1949; Moldenke, Phytologia 3: 75 (1949) and 3: 290. 1950; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; Moldenke, Résumé 110, 120, 122, 128, 224, 343, 344, 368, 373, & 473. 1959; Moldenke, Résumé Suppl. 2: 13 (1960) and 3: 15. 1962; A. Putz, N. Y. Herald Trib., sect. 4, p. 18, February 4. 1962; Moldenke, Résumé Suppl. 7: 5, 7, & 9. 1963; Moldenke,

Phytologia 9: 70, 71, 87, & 88 (1963) and 9: 394, 395, 397, & 403. 1964.

Illustrations: Sweet, Brit. Flow. Gard. 3: pl. 295 [in color]. 1829; Lodd., Bot. Cab. 16: pl. 1550 [in color]. 1829; Maund, Bot. Gard. 3: pl. 70 [in color]. 1829-1830; Reider, Ann. Blumisterei 7: 291 [in color]. 1831; Payer, Organog. Comp. Fl. pl. 115. 1857; Rümpler in Vilm., Illustr. Blumeng., ed. 1, 1262. 1873; Vilm., Alb. de Cliches, ed. 2, fig. 25680. 1888; Augusto, Fl. Rio Grande do Sul fig. 104. 1946.

Much-branched, creeping, perennial herb, to 50 cm. tall; branches ascending, densely spreading-hirsute; leaves decussate-opposite; leaf-blades ovate, 2.5—4 cm. long, pinnatifid-dissected, narrowed at the base into a winged petiole, rather densely hirsutulous on both surfaces, the segments broad, oblong, rather acute, somewhat revolute-margined; spikes terminal, pedunculate, solitary or ternate, densely congested-capitate, not elongating after anthesis; bractlets less than half as long as the calyx, densely white-villous; flowers with a strong but not unpleasant odor of vanilla; calyx cylindric, 6—9 mm. long, densely hirtellous; corolla hypocrateriform, varying from blue or violet to pink, purple-pink, purple, lilac, or rosy-lilac, perhaps also white (?), turning bluish-purple in drying, its tube scarcely surpassing the calyx, the limb about 7 mm. wide.

This species has been collected among grasses and weeds, among shrubs on shrubby mountainsides, on mountains, dunes, and seashores, in barrancas, hedgerows, maritime sands, fields, parks, campos, and rocky or stony places, at altitudes of 200 to 3500 meters, as well as at sea-level, flowering from August to February and in May. It was apparently introduced into cultivation in 1827. The name, V. pulcherrima Harvey, is based on Herb. Harvey s.n., collected from cultivated material in Pisa, Italy, in 1848, and deposited in the Dudley Herbarium at Stanford University. Verbena pulcherrima Vilm. is a synonym of V. laciniata (L.) Briq., V. pulchella Greene is V. racemosa Eggert, and V. pulchella var. maonetti (Regel) Regel is V. tenera var. maonetti Regel.

Hunziker reports this species as "rather frequent" in Buenos Aires province; Legrand found it "in terreno fresco algo sombreado"; while Gallinal and his associates found it in "ladera pratenses rocosas, lugar pastoreado" and "porte ascendente en lugar sin pastorea". Common names recorded for it are "beautiful verbena", "bouquet verbena", "hübsches Eisenkraut", "margarita morada", "moss verbena", "pretty vervain", "schönes Eisenkraut", "verveine délicate", "verveine gentille", and "verveine jolie" — the fourth and fifth of these, however, are applied to several other species in the genus.

Rümpler (1873) describes V. pulchella as follows: "Brasilien. - Einjährig, im Gewächshause ausdauernd. - Leicht behaart, stark verästelte Pflanze mit weitschweifigen, Wurzel schlagenden, niedergestreckten, dann aufrechten, ziemlich langen, aber nur bis zu 15—30 Centimeter sich erhebenen Aesten. Blätter gegenständig, fiedertheilig, mit linienförmigen spitzen Läppchen.

Blume violett-rosa, in einzeln odor zu drei stehenden, Anfangs dichten und doldenförmigen, aber während der Blüthe sich streckenden Aehren; Kelch behaart, zwei Mal länger, als die spitzlanzettlich Blüthendeckblättchen; Blumenkrone zwei Mal länger, als der Kelch. Saum von mittler Grösze und mit verkehrt-herzförmigen Lappen." Because of his statement about the elongation of the inflorescence during anthesis, it seems obvious that he is not referring here to the same taxon to which we now apply this name. The colored illustration given in Reider, Ann. Blumisterei 8: [pl. 12] (1832) as V. pulchella also appears to be not this species at all, but V. tenera Spreng. instead. Neal (1948) records a "V. erinoides" from Hawaiian gardens, which she says is the same as V. pulchella -- her plants, however, examined by me, are V. tenuisecta Briq. The Baileys (1935) make the assertion that the material called V. dissecta and V. tenera in the horticultural trade is actually V. pulchella. I have seen material of all three of these species in cultivation, but most abundantly of V. tenera. Rümpler (1873) and Rodigas (1902) are of the opinion that V. tenera Spreng. and V. geraniifolia Hort. are synonyms of V. pulchella, but I regard V. tenera as a valid species and place V. geraniifolia in its synonymy.

Briquet (1904) suggested that V. sabini Sweet may be conspecific with V. pulchella, but I regard it as a variety of V. laciniata. Morren (1870) apparently regarded V. pulchella as a synonym of V. tenera, as did also Jackson (1895), Steudel (1841), and Walpers (1845).

The Loud., Hort. Brit. Suppl. 2: 680 (1839) reference is sometimes credited to W. Baxter, but apparently in error. A "V. pulchella corolla albida" is also recorded here and may refer to the same plant which Herter named V. laciniata var. albida, but I have not as yet seen any specimens of V. pulchella which were definitely white-flowered. Ulrich (1872 & 1875) speaks also of this plant as the "Whitish-corollaed Vervain". Herter 1805 was identified by him on the labels as "Verbena laciniata var. albida" -- on some of the labels he says "form. ad typ. verg." He does not, however, appear to state definitely on his labels that the flowers were really white, so I hesitate to formalize the variety.

Osten 3523 was identified by the collector as V. erinoides and as a hybrid between this taxon and "V. chamaedryfolia" which he designated as V. chamaedryfolia x erinoides Osten. He says: "Considerando la gran facilidad con que los horticultures de Europa cruzan la varias especies de Verbena, es muy particular la gran escasez de hibridas espontaneas entre las 3 especies mas comunes en la Banda Oriental, V. chamaedryfolia, erinoides & teucrioides, que se encuentran en los campos en grandes cantidades juntas en las mismas localidades. A pesar de haberme fijado mucho en lo años pasados, no he encontrado mas que 2 veces hibridas entre

teucrioides & chamaedryfolia, una vez en varios exemplares & en todo 2 exemplares de chamaedryfolia x erinoides. Estos exemplares son bien intermediarios, las flores de un color rosado, de poca fragrancia: (chamaedry. tiene flores de un color colorado subido sin fragrancia, erinoides color violeta fragrancia muy pronunciada a vainilla)." What he refers to as "V. erinoides" seems to be V. pulchella, but his "V. chamaedryfolia x erinoides" I regard as typical V. dissecta Willd., at least insofar as I have seen specimens of it so labeled by him.

Material of V. pulchella has been misidentified and distributed in herbaria under the names V. erinoides Lam., V. dissecta Willd., V. crinoides Lam., and V. tenera Spreng. On the other hand, the J. G. Jack 8617 distributed as V. pulchella is actually V. elegans var. asperata Perry; H. Schneider s.n. [N. Y. Bot. Gard. Cult. Pl. R.95/34] is V. tenera Spreng.; and Bevoises s.n. [Green Farms, Aug. 1934], Clausen & Lawrence H.399, & Gresino s.n. [VIII.1928] are V. tenera var. maonetti Regel; while the Collector undesignated s.n. [in horto Anglica legi], Herb. Decaisne s.n. [H. P.], Herb. Harvey s.n. [h. M. P., junio 1843], Herb. Hort. Bot. Petrop. s.n., Herb. Meisner s.n. [20 Jul. 1837], and Neal s.n. [June 1, 1941] & s.n. [Feb. 28, 1945] are V. tenuisecta Briq.

The J. H. Cowen s.n. [Cornell U., Ithaca, April 1900], cited below, was grown from seed procured from Germany. The collector asks "is it V. tenera of South America or V. bipinnatifida of Texas?", to which Perry replied "Not V. bipinnatifida of Texas — V. tenera?"

In all, 78 herbarium specimens, including type material of one of the names involved, and 3 mounted illustrations have been examined by me.

Citations: BRAZIL: São Paulo: J. T. Lima s.n. [Herb. Jard. Bot. Rio de Jan. 55466] (N). URUGUAY: J. Anderson 103 (Bm); Arechavaleta 23 (Ug), 24 [Oct. 1876], 24 [3129; Nov. 1877] (Ug, Ug), 3131 [23] (Ug), s.n. [Feb. 1909] (Ug); Cabrera 3226 (N, N, N, Ug); Gallinal, Aragone, Bergalli, Campal, & Rosengurtt PE.5048 (N), PE. 5048 1/2 (N); Herter 181g [Herb. Herter 83911] (N), 1805 [Herb. Herter 96556] (Ew, La, Mi, N, N, V), s.n. [Herb. Osten 19204] (Ug); Legrand 85 (Ug), 215 (Ug), 1702 (Ug); Lombardo 2786 (N); Née 83 (Q); Osten 3112 (Ug), 3305 (Ug), 3313 (Ug), 3315 (Ug, Ug), 3316 (Ug), 3523, in part (Ug), 3923 (Ug), 14676 (Ug), 22006 (Ug, Ug), 22096 (Ug); Rosengurtt B.992 (N), B.2116 1/2 (N); Safford s.n. [Independencia, Oct. 24, 1886] (W--922264); Schröder 3523a (Ug), s.n. [Herb. Osten 16546, in part] (Ug); Seijo 650 (Ug), s.n. [24 Nov. 1884] (Ug); Teisseire s.n. (Ug). GORRITI ISLAND: Osten 4041 (Ug). CHILE: Antofagasta: Barros Valenzuela 8030 (N). ARGENTINA:

Buenos Aires: Boffa 330 (Ug); Cabrera 10352 (W—1988265); Eyerdam & Beetle 23039 (Ca—652428); A. T. Hunziker 4539 (N, N, S); Krapovickas 3086 (N); Martinez Crovetto 32 [A. G. Schulz 1899] (Sz); Osten 2678 (Ug), 2707 (Ug); Parodi 8563 [Herb. Osten 20938] (Ug, V), 12240 (N); Rodrigo 2339 (N); Troncoso 172 (N); Wall & Sparre s.n. [3/11/46] (Ew, Ew, Ew, Ew). Mendoza: Smitt s.n. [1890—91] (S, S). Santiago del Estero: Frenguelli 105 (N), 137 (N). Tucumán: Venturi 4295 (W—1591442). CULTIVATED: France: Herb. Hort. Bot. Huber 753 (M). Italy: Herb. Harvey s.n. [h. P., 1848] (Du—166493). New York: J. H. Cowen s.n. [Cornell U., Ithaca, April 1900] (N). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated s.n. (Ug, Ug). MOUNTED ILLUSTRATIONS: Lodd., Bot. Cab. 16: pl. 1550. 1829 (N); Sweet, Brit. Flow. Gard. 3: pl. 295. 1829 (N); Vilm., Alb. de Cliches, ed. 2, fig. 25680 (N).

VERBENA PULCHELLA f. LATILOBATA Moldenke, Phytologia 3: 281. 1950.

Bibliography: Moldenke, Phytologia 3: 281 & 289. 1950; Moldenke, Résumé 120 & 473. 1959.

This form differs from the typical form of the species in having the leaf-segments very broad, 3—7 mm. wide, and obtuse at the apex. The corolla is described as lilac.

The type of the form was collected by Mariano B. Berro (no. 4751) at Barra Santa Lucia, in the department of Montevideo, Uruguay, on October 30, 1907, and is deposited in the Britton Herbarium at the New York Botanical Garden. It is known thus far only from the type specimen.

Citations: URUGUAY: Berro 4751 (N—type).

VERBENA PULCHRA Moldenke, Phytologia 2: 476—477. 1948.

Bibliography: Moldenke, Phytologia 2: 476—477. 1948; Moldenke, Castanea 13: 117. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94, 107, & 199. 1949; Moldenke, Phytologia 3: 75 & 136 (1949) and 3: 289. 1950; Stellfeld, Trib. Farmac. 19 (10): 167. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Angely, Fl. Paran. 7: 6 & 13 (1957) and 12: 17. 1958; Moldenke, Résumé 110, 120, 128, & 473. 1959; Angely, Fl. Paran. 16: 79 (1960) and 17: 46. 1961.

Herb; stems procumbent or ascending, several, not branched, sharply tetragonal, sulcate between the angles, scabrous with many short reflexed hairs; principal internodes 3—8 cm. long; nodes more or less annulate; leaves numerous, decussate-opposite, usually with clusters of smaller ones in their axils; petioles slender, 5—8 mm. long, rather sparsely strigose with short antrorsely curved hairs, margined; leaf-blades chartaceous, somewhat lighter beneath, elliptic or narrow-lanceolate, varying to oblanceolate, 1.5—5.5 cm. long, 6—15 mm. wide, acute at the apex, attenuate or acuminate at the base, rather irregularly dentate from the apex almost to the base with rather broadly triangular acute teeth, slightly scabridous-strigillose above, rather softly short-

pubescent beneath with bulbous-based hairs; midrib very slender, plane above, prominulent beneath; veinlet reticulation mostly indiscernible above, conspicuous (but not elevated) beneath; inflorescence terminal and in the uppermost axils, the floriferous portion very dense, at first flattened-subcapitate, later elongating to 3 cm. but remaining very dense; peduncles rather stout, 6--8.5 cm. long, tetragonal and sulcate like the stems, reflexed-pilose and more or less rough to the touch; bractlets lanceolate, 4--9 mm. long, 1--1.4 mm. wide, attenuate-acute or subacuminate at the apex, glabrous (or very sparsely pilosulous) except for the long-ciliate margins; calyx tubular, 10--12 mm. long, about 1 mm. wide, 5-costate, purplish especially toward the apex, ciliate-pubescent on the ribs, the teeth unequal, 1--2 mm. long, filiform-appendaged; corolla showy, blue or blue-violet to rose-violet or violet, its tube 15--17 mm. long, very sparsely and minutely puberulent or merely pulverulent on the outside above the calyx, its limb to 15 mm. wide, pilose in the throat.

The type of this species was collected by Per Karl Hjalmar Dusén (no. 9334) in wet thickets at Calmon, Paraná, Brazil, on March 13, 1910, and is deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm. The calyxes on the type specimen are mostly infested with a fungus which forms tiny brown dots over the surface, which dots under the microscope reveal themselves to be composed of masses of tiny brown filaments. The species inhabits campos and, according to Arechavaleta, "tierras frescas herbosas", blooming from January to April and in October and November. Material has been misidentified and distributed in herbaria under the name "Verbena aff. phlogiphlora Cham."

In all, 19 herbarium specimens, including the type, and 4 mounted photographs have been examined by me.

Citations: BRAZIL: Paraná: Braga & Lange 255 (Bm); Dusén 9334 (F--photo of type, N--isotype, N--photo of type, S--type, Si--photo of type, Z--photo of type); Hatschbach 4369 (Z). Rio Grande do Sul: Henz 29682 (N, Rb); Malme 1026 (N, S), 1026a (S); Rambo 30980 (N). São Paulo: Brade 16268 [Herb. Jard. Bot. Rio de Jan. 42222] (N, N). URUGUAY: Arechavaleta 35 (N), s.n. [Tacuarembó, Nov. 1903] (Ug, Ug); Legrand 2561 (Ug); D. Wright s.n. [Cuñapiru, 1928] (Bm). ARGENTINA: Misiones: Ekman 1980 (N); G. J. Schwarz 2523 (N).

VERBENA PULCHRA var. PALUDICOLA Moldenke, Phytologia 2: 477. 1948.

Synonymy: Verbena menthaefolia Herter ex Moldenke, Résumé Suppl. 7: 9, in syn. 1963 [not V. menthaefolia Benth., 1839].

Bibliography: Moldenke, Phytologia 2: 477 (1948) and 3: 75. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 199. 1949; Moldenke, Résumé 120 & 473. 1959; Moldenke, Résumé Suppl. 7: 9. 1963.

This variety differs from the typical form of the species in its leaves being shorter, the blades only 2.4—4.3 cm. long, 1—2 cm. wide, and the corollas white except for a red "eye".

The type of the variety was collected by Wilhelm Gustav Herter (no. 99937) in a rather wet sandy marsh, at an altitude of 150 meters, exposed to the sunlight in an arroyo, at Reanqueras, Rivera, Uruguay, between March 24 and 27, 1907, and is deposited in the Britton Herbarium at the New York Botanical Garden. The taxon is known thus far pnly from the type specimen.

Citations: URUGUAY: Herter 99937 (N--type).

VERBENA PUMILA Rydb. in Small, Fl. Southeast. U. S., ed. 1, 1010 & 1337. 1903.

Synonymy: Verbena inconspicua Greene, Pittonia 5: 137. 1903. Verbena bracteoso-aubletia Hall ex Moldenke, Suppl. List Invalid Names 8, in syn. 1941. Verbena permila Rydb. ex Moldenke, Suppl. List Invalid Names 9, in syn. 1941. Verbena pmila Rydb. ex G. L. Fisher, Am. Bot. Exchange List 1946, sphalm. 1946. Verbena pumila Greene ex Moldenke, Résumé Suppl. 3: 40, in syn. 1962.

Bibliography: Eggert, Torreya 2: 124. 1902; J. K. Small, Fl. Southeast. U. S., ed. 1, 1010 & 1337. 1903; Greene, Pittonia 5: 137. 1903; Prain, Ind. Kew. Suppl. 3: 187. 1908; J. K. Small, Fl. Southeast. U. S., ed. 2, 1010. 1913; E. D. Schulz, 500 Wild Fls. 178. 1922; E. D. Schulz, Texas Wild Fls. 337. 1928; Perry, Ann. Mo. Bot. Gard. 20: 248—250, 312, 314, 338—339, & 356. 1933; Cory, Texas Agr. Exp. Sta. Bull. 550: 89. 1937; E. L. Little, Am. Midl. Nat. 19: 385. 1938; Moldenke, Prelim. Alph. List Invalid Names 45 & 46. 1940; Sperry, Sul Ross State Teach. Coll. Bull. 22: 41. 1941; Moldenke, Suppl. List Invalid Names 8 & 9. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 10, 11, 13, 14, 19, & 102. 1942; Moldenke, Alph. List Invalid Names 45, 48, & 49. 1942; H. S. Gentry, Carnegie Inst. Wash. Publ. 527: [Rio Mayo Pl.] 222 & 306. 1942; Moldenke in Lundell, Fl. Texas 3 (1): 19, 34, & 45—46. 1942; Moldenke, Known Geogr. Distrib. Verbenac. Suppl. 1: 2. 1943; Moldenke, Phytologia 2: 67, 74, 76, 82, & 116-117 (1945) and 2: 165. 1946; G. L. Fisher, Am. Bot. Exchange List 1946. 1946; Moldenke, Alph. List Cit. 1: 13, 27, 35, 42, 47, 49, 59, 77, 89, 93, 108, 115, 122, 125—129, 138, 140, 157, 161, 176, 193, 194, 201, 203, 213, 216, 232, 242, 243, 253—255, 257, 267, 269, & 281. 1946; Tolstead & Cory, Field & Lab. 14: 60. 1946; Moldenke, Phytologia 2: 328 & 383. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 26. 1947; Moldenke, Castanea 13: 112. 1948; Moldenke, Wrightia 1: 234--235. 1948; Moldenke, Alph. List Cit. 2: 398, 400, 403, 407, 450—453, 470, 474--479, 488, 495--497, 506, 514—517, 519, 520, 522, 526, 539--541, 554, 559, 560, 581, 585, 593, 595—598, & 607—609 (1948), 3: 665, 667, 671, 678, 680, 681, 683, 707, 709, 717, 722, 723, 726, 729, 769, 770, 772, 773, 784—786, 788, 789, 795—797, 800, 813, 824, 833, 838, 844, 850, 852, 857, 874, 882, 886, 914, 915, 936, 944, 946, 953, 954, 962, 970, & 978 (1949), and 4: 979, 989—992, 998, 1004, 1010, 1013, 1072, 1075, 1085, 1098, 1107—1109, 1115, 1121, 1122, 1129, 1138, 1139, 1143, 1149—1151, 1162, 1164, 1166, 1172, 1182—1184, 1193, 1203, 1207, 1212, 1216, 1220, 1225, 1226, 1238, 1239, 1241,

1248, 1254, 1291, & 1294. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 18, 21, 24, 25, 33, & 199. 1949; Moldenke, Phytologia 3: 132. 1949; Shinners, Spring Fl. Dallas 325. 1958; Moldenke, Résumé 22, 26, 29, 31, 39, 360, 367, 372, & 473. 1959; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 144. 1961; Irwin, Roadside Flow. Tex. 189--190, pl. 39. 1961; Lewis & Oliv., Am. Journ. Bot. 48: 639--641. 1961; Moldenke, Phytologia 8: 123 (1961) and 8: 196, 212--214, 231, 279, 401, 435, & 437. 1962; Moldenke, Résumé Suppl. 3: 6, 7, & 40 (1962), 4: 4 (1962), 5: 4 (1962), 6: 3 & 10 (1963), and 7: 2 & 3. 1963; Moldenke, Phytologia 9: 17, 18, 24, 62, 143, 193, 195, 197, 199, & 202. 1963; Shinners, Sida 1: 298. 1964.

Illustrations: Lewis & Oliv., Am. Journ. Bot. 48: 640, fig. 2. 1961.

Low soft-hairy annual herb, varying from erect to ascending, partly decumbent, decumbent, procumbent, or prostrate; roots fibrous; stems usually several from a common base, simple or branched at the base, decumbent-ascending, to 30 cm. long, rooting at the lower nodes, hirsute, often finely glandular, the bark pale-green; branches decumbent, to 15 cm. long; leaves decussate-opposite, deltoid to ovate, 1.5--3 cm. long, often obtusely triangular with a cuneate or truncate base contracted into a short narrowly margined petiole, trifid, occasionally lobed, the divisions variously toothed, incised, or dissected, appressed-hirsute on both surfaces; spikes terminal, short-pedunculate or sessile, fairly compact; bractlets linear-lanceolate, almost as long as the calyx, hispid-hirsute; flowers very small, odorless; corolla small, hypocrateriform, varying from blue or pale-blue to pink, deep-pink, dark-pink, bright-pink, orchid-pink, rose-pink, deep rose-pink, pink-lavender, violet-rose, pale-lavender, pale-violet, purplish, purplish-white, reddish-purple, pale-purple, purple, or pinkish-purple with a minute yellow "eye", sometimes described as pink with a paler "eye", its tube 6--10 cm. long, a little longer than the calyx, slightly (if at all) pubescent on the outer surface, its limb 2--5 mm. wide; anther-glands minute or absent; fruiting-calyx about 6 mm. long, pubescent on the outside, hispidulous along the veins, sometimes finely glandular, its lobes short and subulate; fruit cylindric; cocci 2.25—3 mm. long, deeply wrinkled or reticulate-scrobiculate except at the base, the commissural faces muriculate; chromosome number: n = 10.

The type of this common species was collected by Benjamin Franklin Bush (no. 1275) at Catoosa, Rogers County, Oklahoma, on May 8, 1895, and is deposited in the Columbia University Herbarium at the New York Botanical Garden. Cotypes of V. inconspicua were collected by Samuel Mills Tracy and Franklin Sumner Earle -- no. 106, on the plains west of Pecos, Reeves County, on April 20, 1902, and no. 178, in the foothills of the Davis Mountains, Jeff Davis County, Texas, on April 23, 1902. The type of V. bracteosoaubletia was collected by Elihu Hall (no. 431, in part) in dry hills at or near Austin, Travis County, Texas, in May, 1872. On

his labels Hall seems to credit the hybrid name to Asa Gray, saying "Verbena bracteoso-aubletia? so says Gray, but a distinct species" and "V. bracteoso-aubletia fide Gray, but a good fertile species."

It should be noted here that the V. pumila f. albiflora Standl. is actually a synonym of V. quadrangulata Heller. The "V. pumila" of Irwin (1961) is V. tenuisecta Briq., a s is plainly indicated by the plate.

Tolstead & Cory (1946) refer to V. pumila as "an inconspicuously flowered weedy plant." Runyon describes the fruit as "a cylindric capsule". C. M. Rowell 4776, cited below, bears a notation on its label: "with pale purple to white corollas", and so may be a mixture with f. albida Moldenke.

Verbena pumila has been found by collectors at the edge of woods, along roadsides, gravel or rocky clay roadsides, railroad tracks and rights-of-way, arroyos, and the green edges of dried-up streams, growing in moist or dry soil, sandy, dry sandy, or rich sandy soil, black or shaded soil, rocky or rocky-gravelly soil, red or sandy clay soil, limestone soil, much overgrazed coarse red granitic or recently disturbed soil, sand or deep sand, sandy or clay loam, sandy or red sandy clay, or gypsum; in open or low open ground, low damp or moist ground, open sandy or dry open ground, in fields, old fields, and cultivated fields, at the edge of oak woods, in meadows and sandy fields, wet or open rocky meadows, in woods, open or wet woods, open oak or postoak woods, and alluvial woods, in pine forests and sandy pastures, in draws and creek-bottoms, llanos and catch-basins, glades and ungrazed or open pastures, lowlands, limestone scab-lands, desert scrub, in granite or cultivated areas, in dry draws and dry pastures, moist banks and roadside ditches, in creek valleys and river-bottoms, yards, flat sandy areas, floodplains, dry open pastures, low scrub on hilltops, and the sandy bottoms of floodplains. It has been encountered in soil pockets among granite boulders, on hills of granite boulders, in Frank's conglomerate limestone formation, in Woodford chert formation, and in Seguin sand formation of the Wilcox group. It is described as a pioneer in abandoned fields and has been collected also on mesquite savannas, the floors of canyons, gravel and sand bars, small streams, cliffs, limestone ledges and mesas, xeric rocky limestone outcrops, the sides and tops of buttes, dry, sandy, or granite slopes, vacant lots, road shoulders, plains and high rocky plains,flats and clay, gypsum, or open limestone flats, sandy or granite hillsides, foothills and dry granite foothills, as well as on hills and sand hills, rocky and dry rocky hills. limestone and high limestone hills, dry, clay, sandstone, or gypsum hills. It is said to grow on prairies, sandy or loose-sand prairies, and on calcareous and mesquite prairies.

In Texas, in general, it is described as an inhabitant of fields, prairies, and chaparral, meadows, pastures, river-terraces, woods, and sandy slopes and hillsides, blooming from January to August, in the western, central, and southern parts of the state,

from Reeves, Jeff Davis, and Brewster to Cameron, east to Wharton and Walker, and north to Grayson and Childress Counties. Actually, it has been collected in anthesis in every month of the year, fruiting from February to June, August, November, and December, growing at altitudes of 10 to 2830 meters. Jones, Rowell, & Johnston (1961) state that it grows in pasture openings, roadsides, mostly on sandy loam, flowering in spring. Clemens says that it inhabits the "tropical life zone"; Hanson states that it is "common in chaparral and openings", "abundant on prairies", and a "frequent weed in fields"; Warnock found it "scattered on sandy silt flats", while Runyon says "frequent in sandy soil" and "common throughout Cameron County; in the sandy region this plant roots freely at the nodes; it is frequent but not common in Kenedy County", Texas. Bray maintains that it is "very common in dry ground" in Travis County, where Warnock found it "frequent in sandy banks" and Ely "in black soil containing 38 percent silicon dioxide derived from basalt".

In Archer County, Texas, Whitehouse found V. pumila to be "very abundant and forming masses of color in scattered mesquite" and in Montague County in "alluvial sand near postoak woods." Rowell calls it "occasional" in San Patricio County. Shinners (1958) describes it from "sandy, silty, or gravelly ground, frequent and locally common, Prairie Border westward. Late March--May". McCart found it "in light tan loose soil of stabilized sand dunes", while Cory says that it is "frequent in waste ground around shallow ponds" in Hamilton County and "infrequent on roadsides" in Johnson County. Johnson encountered it as "frequent in slightly moist sandy clay loam partly shaded by mixed brush" in Karnes County. Hamby notes "also in Medina, Zavala, Real, Dimmit, & Bandera Counties". Williges found it "occasional in undisturbed caliche." In Garza County it is described by Rowell as "occasional in sandy loam in flats below rim of canyon", while the same collector, in San Patricio County, notes "locally frequent but not in large numbers in deep loose sand along and adjacent to river." In the same county Gould & Hycka found it in "grassland-shrub area along river bank." Lathrop discovered it in Burnet County in sandy soil of xeric hillside with granite outcrops and juniper, Yucca, and cactus common.

In Oklahoma it is said by Eskew to be "common along streams", by Engleman "common in clay banks", and by Stevens "common in open woods"; Waterfall found it "in shallow soil on limestone conglomerate", and Robbins "in moist grassy depressions on open rocky slopes in open oak-hickory woods", while Hopkins reports it from "dry rocky pastures originally shortgrass prairie", "in and along streambanks and in sloughy meadows by creeks", "on limestone slopes of deep wooded ravines", and "in rock pastures in clumps of persimmon (Diospyros) and hackberry (Celtis)". In Sonora it is said by Gentry to be found in "arroyos and milpas, Lower Sonoran; scattered in the arroyos but more colonial in the milpas" and in the "Short-tree area".

Common and vernacular names recorded for this species are "bartanucha", "kawiyo", "hairy verbena", "low verbena", "pink ver-

bena", "pink vervain", "small-flowered verbena", and "wild verbena"
Material of V. pumila has been misidentified and distributed in herbaria under the names V. ambrosiafolia Rydb., V. aubletia Jacq., V. bipinnatifida Michx., V. bipinnatifida Nutt., V. bracteata var. brevibracteata Gray, V. bracteosa Michx., V. bracteosa var. brevibracteata Gray, V. canadensis (L.) Britton, V. canescens H.B.K., V. ciliata Benth., V. ciliata var. longidentata Perry, V. delticola Small, V. lambertii Sims, V. quadrangulata Heller, V. racemosa Eggert, V. wrightii A. Gray, Helleranthus quadrangulatus (Heller) Small, and even Glecoma hederacea L. in the Lamiaceae. The Carleton 134 collection bears a note reading "V. bipinnatifida Nutt., a dwarf form. This species and V. aubletia evidently run together." Hayes 610 was first identified as V. bipinnatifida, then as V. ciliata, and finally as V. pumila.

On the other hand, the R. Runyon 2359, 2366, & 2499, distributed as V. pumila, are f. albida Moldenke; Shreve 7169 is actually the type collection of V. bajacalifornica Moldenke; Reynaldo Ramirez 36 & Waterfall 13097 are V. bipinnatifida Nutt.,;H. C. Hanson 304 is V. ciliata var. longidentata Perry; B. H. Warnock 14693 is V. quadrangulata Heller; B. H. Warnock 46135 & 47011 are V. racemosa Eggert; and G. J. Goodman 2398 & 2412 are V. wrightii A. Gray. The A. A. Heller 1385, previously cited by me as V. pumila, is actually V. ciliata Benth., while Clover 567 is V. teucriifolia Mart. & Gal. The E. Hall 431 and M. Hawkins 37 are mixtures with V. bipinnatifida Nutt.; H. C. Hanson 322 and Ruth 110 are mixtures with V. ciliata var. longidentata Perry; Rose, Standley, & Russell 12745 is a mixture with V. gooddingii var. nepetifolia Tidestr.; Parry, Bigelow, Wright, & Schott 830 is a mixture with V. racemosa Eggert; and Wencurtin s.n. [5-2-1916] is a mixture with V. wrightii A. Gray. Edw. Palmer 246 is a mixture with V. bracteata Lag. & Rodr. and V. canadensis (L.) Britton -- apparently Asa Gray combined three of Palmer's field numbers under the one number "246": his original no. 21, collected on April 6 in Caddo County, appears to be the V. canadensis portion, and his original no. 167, collected on May 22 in the same county, is V. bracteata, leaving his original no. 438, collected on June 24 in Garvin or possibly in Johnston County, as V. pumila. Edw. Palmer 247 is also a mixture with V. canadensis -- here Gray combined two of Palmer's original field numbers under "247": his original no. 260, collected on June 11 in Garvin County, seems to have been V. canadensis, while his original no. 390 , collected on July 1 either in Johnston or Atoka County, seems to be V. pumila. The printed labels on all these are inscribed "On the False Washita between Fort Cobb and Fort Arbuckle".

Lundell & Lundell 10226 was determined by me and distributed as V. quadrangulata Heller, but the United States National Herbarium sheet does not exhibit beaked cocci. The E. J. Palmer 13562 specimen in the same herbarium has cocci with definite beaks and is therefore cited by me under V. quadrangulata. E. L. Little says of his no. 472: "V. bracteosa. Possibly a hybrid with V. canadensis as the bracts are short", but to me the specimens appears to be typical V. pumila. The Lindheimer 1075 collection may be from either Comal or Comanche County -- its label is inscribed "Comanche Spring: New Braunfels, etc." The printed labels on C. Wright 1500 are inscribed "Coll. N. Mex.", but Perry (1933) cites the collection from "southwest Texas, 1851-2". J. Frank Normand's surname is incorrectly written "Norman" on some labels.

Perry (1933) cites the following 66 additional specimens not as yet seen by me: OKLAHOMA: Comanche Co.: M. K. Clemens 11752 (E). Johnston Co.: H. W. Houghton 2570 (G). Murray Co.: Emig 401 (E); G. W. Stevens 28 (E, G); Stratton 11 (E). Rogers Co.: B. F. Bush 1275 (E--isotype). TEXAS: Bastrop Co.: E. J. Palmer 33367 (E). Bexar Co.: B. F. Bush 1185 (E); Clemens & Clemens 976, in part (E); Eggert s.n. [San Antonio] (E); G. Jermy 209 (G), s. n. [Bexar Co.] (E); Trelease 99 (E); Wilkinson 8 (E), 108 (E). Blanco Co.: E. J. Palmer 13281 (E). Cameron Co.: H. C. Hanson 322 (G), s.n. [Brownsville, 23 Jan. 1919] (E). Comal Co.: Lindheimer 434 (E), 1075 (E, F, G). Comanche Co.: Eggert s.n. [Round Top Mountain, 9 May 1900] (E), s.n. [near Comanche, 10 May 1900] (E). Dallas Co.: J. Reverchon 738 (E), 1963 (E, F, G), 2117 (E). Gillespie Co.: G. Jermy 184 (E). Haskell Co.: Morton s.n. [Haskell, 1898] (E). Hood Co.: Eggert s.n. [near Granbury, 6 May 1900] (E). Howard Co.: Eggert s.n. [Big Spring, 11 June 1900] (E). Jeff Davis Co.: Tracy & Earle 178 (E, F, G). Kerr Co.: E. J. Palmer 9278 (E), 10003 (E). Reeves Co.: Tracy & Earle 106 (E, F, G). San Saba Co.: E. J. Palmer 11843 (E). Tarrant Co.: Ruth 110, in part [Polytechnic, 10 April 1913] (E), 110, in part [Tarrant Co., June 1913] (G). Travis Co.: E. Hall 428 (G), 431, in part (E); E. J. Palmer 9339 (E); M. S. Young s.n. [Austin] (E, G). Uvalde Co.: E. J. Palmer 13562 (E). Victoria Co.: Eggert s.n. [near Victoria, 11 April 1900] (E, G). Walker Co.: E. J. Palmer 13175 (E). Wharton Co.: E. J. Palmer 4840 (E), 4977 (E). County undetermined: Lindheimer III.501 (E, F, G); C. Wright 1500 (D, E, F, G). NEW MEXICO: County undetermined: C. Wright 1501 [1851--2] (D). MEXICO: Sinaloa: M. E. Jones 23243 (E). Sonora: Edw. Palmer 326 (G). She says "Verbena pumila has often been confused with V. quadrangulata and, superficially, closely resembles it, but is readily separated on the beakless nutlets." The "Reverchon 1963" which she cites is cited by me below as "J. Rev-

erchon s.n. [Curtiss 1963]" — her "NY" specimen is actually in the Barnard College Herbarium. Her "NY" citation for C. Wright 1500 is based on a Torrey Herbarium specimen. She cites Lindheimer 434 from Comal County, but I cite it below from Bexar County. She cites "V. brevibracteata Eggert, Torreya 2: 124. 1902, not V. bracteosa var. brevibracteata Gray, Syn. Fl. N. Am. 2^1: 336. 1878" as a synonym of V. pumila. However, Eggert plainly bases his binomial on the trinomial of Gray and the latter belongs in the synonymy of V. bracteata Lag. & Rodr. The names, V. brevibracteata Eggert and V. brevibracteata (A. Gray) Eggert, therefore, which in my previous publications have been reduced to V. pumila belong, instead, in the synonymy of V. bracteata.

In all, 608 herbarium specimens, including the type collections of all the names involved, and 3 mounted illustrations and clippings have been examined by me.

Citations: ARKANSAS: Sevier Co.: Brinkley 47 (Au). OKLAHOMA: Beckham Co.: C. T. Eskew 1605 (Ok). Blaine Co.: Cutter s.n. [Salt Creek Canyon, May 5, 1951] (Ca—986212, Ok); J. Engleman 1270 (Ok), 1274 (Ok), 1275 (Ok); G. J. Goodman 2377 (Gg—310869, Io—143272, N, Ok, Se—41665); J. B. Taylor 112 (St). Caddo Co.: D. H. Dunn 3 (St—20059); Edw. Palmer 245 (C, C). Canadian Co.: M. Hopkins 1399 (Ok). Carter Co.: M. Hopkins 4693 (S); A. G. Payne 37 (Ok); Rice 36 (Ok); Rinehart 192 (Ok). Cherokee Co.: C. S. Wallis 546 (St). Cleveland Co.: Hambrack 51 (Ok—10284); Jeffs 83 (Ok—14956); M. Nielsen s.n. [May 16, 1924] (Ok—10278). Comanche Co.: P. V. Beck 144 (Ok); Bull 38 (Ok—14911); Chilcott s.n. [Lawton, 6 April 1926] (Um—20); M. K. Clemens 11752 (Ba); C. T. Eskew 1543 (N, Ok), 1570 (Ok), 1676 (Ok); S. Fry 173 (St—14010), s.n. [April 23, 1938] (Gg—310870); M. Gates s.n. [April 2, 1950] (Ok); Hopkins, Nelson, & Nelson 199 (Au—122517, Ca—742198, Ok), 970 (Ok); E. L. Little 472 (Ok—16614); D. McLean 273 (Hi—152271, St—17800); W. S. Myers 314 (Ok); Waterfall 11938 (Au—122514, St), 13073 (St, W—2260919). Custer Co.: Mericle 495 (Ok). Garvin Co.: Edw. Palmer 246, in part [438] (T). Grady Co.: Dahms 31 (St—9257); Nelson, Smith, & Merkle 107 (Ok). Greer Co.: Bull s.n. [April 25, 1927] (Ok—15043); Logan 50 (Ok). Harmon Co.: Waterfall 9410 (St), 13126 (Au—123206, St, W—2260941). Harper Co.: G. J. Goodman 2398 (Ok). Jackson Co.: B. E. Cole 45 (St—21763); Demaree 12218 (Ok—20379); E. L. Little 532 (Ok—10317); Small & Wherry 12204 (N). Jefferson Co.: Rohrbaugh 493 (Ok). Johnston Co.: H. W. Houghton s.n. [G. W. Stevens 3570] (N); Edw. Palmer 247, in part [390] (T); G. T. Robbins 3256 (Ca—965993, Ok). Kingfisher Co.: Byers 203 (St—14482); J. Engleman 161 (Ok); M. E. Jones s.n. [May 1, 1899] (Po—248005). Kiowa Co.: Ferguson, Buttram, & Buttram 13 (Ok); M. Hopkins 3023 (Ok). Logan Co.: J. Engleman 1276 (Ok); C.

C. Smith 510 (Ok). Major Co.: Goodman & Waterfall 4204 (Au—122518, N, Ok, St). McClain Co.: M. Hopkins 1278 (Ok). McCurtain Co.: Demaree 12630 (Ok—22232); Waterfall 15897 (Hi—195395, Hi—200233, St). Murray Co.: J. F. Brenckle 48066 (N, W—2003823); Coleman 18 (We); Couch C-6 (Ok); E. E. Dale 19 (Ok), 297 (Ok); Demaree 12292 (Ok—22245); G. J. Goodman 2079 (Ok—17715); M. Hawkins 37, in part (Ok), 39 (Ok); M. Hopkins 2757 (Ok), 2766 (Ok), 4802 (Ok), 5091 (Ok), 5735 (Ok), 5961 (Ok); Hopkins, MacDowell, & Copeland 6390 (Ok); Hopkins, Nelson, & Nelson 139 (Au—122516, Ok), 150 (Ok), 159 (Au, Au—122519, Ca—742336, N, Ok, S, St—26117, W—1862729), 905 (Au, Au—122515, Ca—733376, Mv, Ok); D. J. Hutchinson 75 (St); Rice 23 (Ok); G. T. Robbins 2449 (Ca—903956, Ok); Stratton 11 (N, St—26120, St—25121); G. W. Stevens 28 (Du—65694, N, Ok, Ok, St—9221, Ur, W—588952), 28b (Ok—20731), A.28 (St—9220); Tripp 122 (St—9258). Muskogee Co.: M. Hopkins 3978 (Ok); E. L. Little 1576 (Ok—10316). Oklahoma Co.: M. A. Carleton 134 (Ka, W); Waterfall 389 (Ok), 1117 (Ok, St), 2600 (Ok), 2622 (Ok, St). Payne Co.: F. Clark 254 (St—9256); Kenworthy 23 (Au). Rogers Co.: B. F. Bush 1275 (C—type). Sequoyah Co.: C. S. Wallis 6490 (Au—171374, St). Stephens Co.: Mericle 614 (Ok); Waterfall 3652 (Ok, St). Washita Co.: Stratton 4295 (St—26133, St—26134); Waterfall 11916 (St). County undetermined: G. W. Stevens A.15.5 (Ok). TEXAS: Archer Co.: Purcell 4 (Au), s.n. [Archer City, April 4, 1934] (Au); Whitehouse 9555 (N, No—14970), 9614 (Mi, N). Atascosa Co.: Mebane s.n. [Pleasanton road, 3/2/1926] (Wi); E. J. Palmer 11231 (Ca—425606). Bastrop Co.: Bogusch 748 (W—1285713); H. H. Duval 14 (W—1569751); Marrs s.n. [Smithville, 3-17-1930] (Au); McCart 5705 (Au—122480); E. J. Palmer 33367 (N, W—1532535). Baylor Co.: Whitehouse 9630 (Mi, N). Bee Co.: F. B. Jones 1732 (Ww); M. E. Jones 29191 (Po—199869). Bell Co.: Normand s.n. [4/4/28] (Au); Wolff 607 (Tr—16210), 1373 (Hp, Tr—16212). Bexar Co.: Clare 524 (Gg—267606); Clemens & Clemens 975 (Po—69915), 976, in part (N, Po—69562); Havard s.n. [San Antonio, March 1882] (W—147574, W—218872); G. Jermy 84 (W—315683), 85 (W—315684), s.n. [1904] (N), s.n. [San Ant.] (N, N); Kidder s.n. [San Antonio, 25 Mch. '85] (Oa—10738); Lindheimer 434 (Ka); Metz 152 (N), 524 (I, I, S), 2479 (N), 3246 (Pl—151578); Patoni s.n. [San Antonio, Marzi 1914] (Me, Me); Ripley & Barneby 4143 (Gg—301324, N); E. D. Schulz 767, in part (Wi), s.n. [So. S. A., 4-14-22] (Au), s.n. [9 mi. so. San Antonio] (Wi, Wi). Blanco Co.: E. J. Palmer 13281 (B); Tharp s.n. [3/13/38] (Ca—882799). Bowie Co.: Tharp s.n. [Smithville, 4-16-1932] (Au). Brazos Co.: Cory s.n. [College Station, 4-9-26] (Tr—16204); H. B. Parks 144 (St), s.n. [College Station, December 14, 1946] (Au—122569); Reeves 198 (Cs); Rowell

9051b (N); Trew 188 (Au--122577). Brewster Co.: Cory 28682 (N); Cutler 672 (Tr--21141); C. Newman s.n. [Sperry T.127] (Om); Parks & Cory 18716 (Tr), 18717 (Tr); Sperry 493 (W--1679313), T.127 (W-1679250), T.565 (Om), T.566 (Fs, Om); W. P. Taylor s.n. [3-31-44] (Au); B. H. Warnock C.800 (N), W.166 (N). Brooks Co.: Ecology Class Univ. Texas s.n. [Falfurias, 3.2.30] (Au); Lundell & Lundell 10071 (Ld, N). Burnet Co.: Cory 54029 (Rf); E. W. Lathrop 2020 (Lw); C. L. Lundell 15050 (Rf); C. M. Rogers 6668 (Au--122565); Whitehouse s.n. [Marble Falls, 4.13.30] (Au). Caldwell Co.: Mc Bryde s.n. [3/6/31] (Au), s.n. [Spr.-Sum. 1931] (Au). Cameron Co.: J. F. Brenckle 47-338 (N); Cory 28300 (N), 28308 (N); Fleetwood 3442 (Au--192005); H. C. Hanson 304 (N), 322, in part (Bl--42329, Ka--60567, Mi, N, Ur, W--982768), s.n. [Brownsville, Jan. 30, 1919] (Au); F. L. Lewton 214 (Ar--271609, W); Tharp 1871 (Au, W--1203149); C. H. Townsend 8 (W--279251). Childress Co.: Biology Class Univ. Texas s.n. [Childress, May 1930--31] (Au). Coke Co.: Cory 37143 (N, N). Comal Co.: Lindheimer 1075 (Au, Br, Ca--147516, Me, Me, Me, N, Ok--10350, Up--48538, W--502448). Comanche Co.: Phipps s.n. [Comanche, April 1931] (Au). Cooke Co.: D. S. Correll 16280 (Rf). Crosby Co.: C. O. Erlanson 1160a (Mi); Wolff 2031 (Tr--16213, W--1623983). Dallas Co.: Boll s.n. [1871] (Cb); I. E. Diehl 6 (Po--248006); Lundell & Lundell 8578 (Ld, Mi, Mi, N, N), 9178 (Ld, Mi), 12818 (Rf, Sm); J. Reverchon 738 (Up--17102, W, W--147573), s.n. [Curtiss 1963] (Bc), s.n. [Curtiss 1963**] (Go), s.n. [April 1878] (Bc); M. R. Stephenson 199 (W--1580366), s.n. [vicinity of Dallas, Apr. 1, 1928] (W--1580365), s.n. [near Dallas, Apr. 6, 1929] (W--1580488). Denton Co.: B. B. Harris s.n. [Spring '26] (Nt, Nt); Lundell & Lundell 8431 (Ld, Mi, N); McCart 1597 (N, Nt). Dickens Co.: Parks & Cory 13619 (Tr--16205). Dimmit Co.: Hoglund s.n. [Carrizo Spr., 4.6.30] (Au). Duval Co.: Croft 6515 (W--147572). Eastland Co.: Cox s.n. [Rising Star, 4-22-31] (Au); H. E. Parks 14393 (Md); Parks & Cory 13146 (Tr--16201), 14392 (Tr--16201); Wolff 2057 (Tr--16211). Ector Co.: Lundell & Lundell 11401 (N, Rf). Edwards Co.: Cory 37068 (Au), 37070 (N, N), 53678 (N); Cutler 789 (Ba); M. E. Jones 26220 (Du--235291, Gg--237846, Po--178867), 26228 (I, Po--178363). Erath Co.: Gough s.n. [3/25/21] (Au). Fannin Co.: Mrs. J. M. Milligan s.n. (W--504332). Fisher Co.: T. M. Shepherd s.n. [Ray's Pasture, Grady, Mch. 31, 1901] (W--413916). Frio Co.: Barkley, Painter, & Lucas 14201 (S); Painter, Lucas, & Barkley 14201 (Au, Ok), 14213 (Au, B, Ok, S). Garza Co.: C. M. Rowell 5636 (Au--195257). Gonzales Co.: Bogusch s.n. [2-20-1926] (Au); Johnston & McCart 5226 (Au--122473); E. D. Schulz s.n. [Ottine, Spring 1924] (Wi); Tharp s.n. [Ottine, 3-21-36] (Au). Grayson Co.: Harold Gentry 87 (Au), 50-94 (Au--122574);

McCart 1575 (Au, N, Nt, W--1825822); Van Meter 11 (N, N). Guadalupe Co.: Johnston & McCart 5037 (Au--122474). Hamilton Co.: Cory 54000 (Rf); Wolff 2091 (Tr). Hardeman Co.: C. R. Ball 1114 (N, W--501587); Herb. Univ. Texas s.n. [Quanah, 4-21-1931] (Au); Parks & Cory 13373 (Tr--16209); Science Dept. Univ. Texas s.n. [4/21/31] (Au). Harris Co.: G. L. Fisher 338 (W--503329). Hays Co.: Friesner 10401 (Bt--38740); Stanfield s.n. [San Marcos, Aug. 1897] (N). Hidalgo Co.: Cory 28214 (N). Hockley Co.: Rachaner 131, in part (Au), 135 (Au, N). Howard Co.: Parks & Cory 12538 (Tr). Jack Co.: Whitehouse 15311 (Sm). Jeff Davis Co.: Tracy & Earle 178 (Au, Cm, Es, It, N, N--photo, Tr, W--441837, Z--photo); Warnock, Hinckley, & McVaugh 3795 (N). Jim Hogg Co.: McCart 7480 (Ok). Jim Wells Co.: Freeborn & Freeborn 315 (N). Johnson Co.: Cory 53968 (Rf); Whitehouse s.n. [Cleburne, May 3, 1931] (Au). Jones Co.: N. C. Henderson 63-32 (Au--217678). Karnes Co.: Collector undesignated s.n. [Brackenridge Park, 3-13-19] (Wi); J. C. Johnson 1128 (Z), 53-870 (Au--122470). Kaufman Co.: Harold Gentry 2699 (Hi--116717); F. J. Tyler s.n. [vicinity of Terrell, April 23, 1904] (W--500805), s.n. [vicinity of Terrell, May 13, 1904] (W--500806). Kenedy Co.: Harold Gentry 52-667 (Au--122505); Lundell & Lundell 8731* (Mi). Kerr Co.: E. J. Palmer 9278 (Bi, Du--205593, S). Kimble Co.: M. E. Jones 28511 (Po--190055). Kinney Co.: Mearns 1282 (Du--24193, W--229528). Kleberg Co.: M. C. Johnston 53253.19 (Au--122467); J. F. Sinclair s.n. [Kingsville, Spring 1940] (Au); Tharp & York 51-240 (Au--122583, St). Liveoak Co.: Tharp s.n. [March 22, 1931] (Au); Whitehouse s.n. [March 22, 1931] (Sm). Llano Co.:Barkley, Webster, & Tharp 47268 (Au, N); G. L. Fisher s.n. [Bluffton, Apr. 20, 1931] (B, Bt--37796, Gg--222545); M. E. Jones s.n. [Llano Grande, March 27, 1932] (Po--199868); Le Sassier 95 (Au--169654); Rose-Innes & Warnock 793 (Au); Whitehouse s.n. [Enchanted Rock, Spring '31] (Au). Lubbock Co.: Demaree 7450 (Du--205682, W--1699018); Studhalter 1118 (W--1285908). Maverick Co.: Bogusch s.n. [February 17, 1927] (Ob--50827). McCulloch Co.: Studhalter 1106 (W--1285900). McLennan Co.: Ricker 3364 (W--501878). Medina Co.: C. L. Lundell 10981 (N, Rf, Rf, W--1926939). Milam Co.: G. L. Fisher s.n. [Rockdale, Apr. 18, 1931] (Ew). Mitchell Co.: Finley 9a (Au); R. W. Pohl 4843 (Sm). Montague Co.: Whitehouse 15038 (Mi, N). Nolan Co.: V. E. Stanfield 3 (Au). Nueces Co.: E. J. Palmer 11222 (Ca--425654). Palo Pinto Co.: M. Parks s.n. [Palo Pinto, April] (Au). Parker Co.: Shinners 10954 (Tl); Wadsworth s.n. [Milsap, 1930--31] (Au). Randall Co.: Lundell & Lundell 11435 (N, Rf). Reagan Co.: Wild Flower Contest 42 (Au). Red River Co.: Wilfong 16 (Sm). Reeves Co.: Cory 27906 (N); Tracy & Earle 106 (Cm, Tr, W--441808).

Refugio Co.: F. B. Jones 1712 (Ww). San Patricio Co.: Gould & Hycka 8061 (Au—194266); F. B. Jones 1808 (Ww); C. M. Rowell 4776 (Ww), 5258 (Au—195926); E. D. Schulz 845 (Wi); Tharp s.n. [Sinton prairie, 3/23/31] (Au); Williges 25 (Au—175629), 357 (Au—179741). San Saba Co.: Lewis & Oliver 5435 (Nb); B. Norton s.n. [Cherokee, 4-1-1931] (Au); E. J. Palmer 11843 (Au—122568, Ca—425592). Schleicher Co.: Cory 34444 (N, N). Shackelford Co.: N. C. Henderson 63-38 (Au—217675); Rohrbaugh 470 (Ok). Sutton Co.: M. E. Jones 28512 (Po—190054); R. W. Pohl 4759 (Sm); Rohrbaugh 372 (Ok). Tarrant Co.: Killian 6794 (Au, W—1465237); Ruth 110, in part (Cm, Io—113565, Mi, Mi, Rf, Up, Ur, W—1488947). Taylor Co.: Tolstead 7071 (Au, Au, Ca—882801, Mi). Tom Green Co.: Cory 40913 (N, N); Lewis & Oliver 5469 (Nb); Parks & Cory 5620 (Tr), 5621 (Tr). Travis Co.: C. C. Albers 34006 (Au); Armer 5381 (Au, W—1438995), s.n. [Austin, 4-2-29] (Pl—151557); Bodin 217a (W); Bogusch & Molby 3009 (Ur); Bray 98 (N); Ely s.n. [Pilob Knob, 21 March 1954] (Au—122192); E. Hall 431, in part (N, Po—248007, Pr, W), s.n. [Austin, 1872] (W—771876); Herb. Univ. Texas s.n. [Deep Eddy, 4-26-36] (Au, Au, Au, Au); Long & Ferguson s.n. [Bee Creek, 4/13/01] (Au); Martindale s.n. [Austin] (Up—17103); E. J. Palmer 9278 (W—1531907), 9339 (Bi, Du—205592, S, W—1531914), 10003 (W—1532016); Tharp 1362 (Au, W—1114413), 1364 (Au, W—1114415), 44116 (Au, Ca—882798, N), s.n. [Country Club, 3-7-28] (Ca—882800); B. H. Warnock 20623 (Au, N), 46086 (Au, Ok, Vi); York s.n. [Austin, 3-18-08] (Au); M. S. Young 114 (N, Po—161333), 115 (Au, Au, Ur, Vi), s.n. [Deep Eddy, 11/15/13] (Nt), s.n. [2/28/14] (Au, N), s.n. [Sandy Creek, 4/22/15] (Ca—882802), s.n. [Austin, 3/9/18] (Ca—882803), s.n. [Austin, 3-12-18] (Mi, N), s.n. [Austin, 8-25-18] (Au), s.n. [west of IAGN Ry.] (Au). Uvalde Co.: Haliel s.n. [Uvalde, 4/17/31] (Au); H. J. Hamby 573 (Ar—206662); Herb. Hapeman s.n. [April 17, 1934] (S); M. E. Jones 28298 (Po—188288), 28518 (Po—190121); E. J. Palmer 13562, in part (B); Parks & Cory 8392 (Tr—16207). Val Verde Co.: Cory s.n. [Del Rio, 3-17-1927] (Tr, Tr—16206); H. C. Hanson 543 (W—982886); Tharp & Havard 49360 (Au—122559). Walker Co.: E. J. Palmer 13175 (W—1603455). Ward Co.: Lundell & Lundell 11382 (Sm). Webb Co.: M. E. Jones 29189 (Po—199870, Po—199871). Wharton Co.: E. J. Palmer 4840 (Po—217663, W—1581011), 4977 (Po—217662, W—1581010). Wichita Co.: Rohrbaugh 488 (Ok); Whitehouse 9513 (Ca—744571, Mi, N, W—1947162), 9524 (Au—122560, N, Tl), 9664 (N), 9669 (N), 10903 (Sm). Wilbarger Co.: Whitehouse 9817a (Ca—744572, N). Willacy Co.: J. F. Brenckle 47-366 (N); M. C. Johnston 54170 (Au—122468). Williamson Co.: Wolcott 121 (Au). Young Co.: Correll & Johnston 22126 (Ld); Hayes 610 (N); McCart 862 (Nt); Whitehouse 15323 (N). Zavala Co.: Herb. Univ. Texas s.n. [Crystal City, 4-6-1930] (Au); B. Stewart 40

(Ok, Ok). County undetermined: Collector undesignated s.n. [4/14/26] (Sr); Lindheimer III.501 [Herb. Reichenb. f. 92421] (Ca--248243, V, W); Metz 3095 [Texas Military Inst.] (St); Turpin s.n. (Au, Au); C. Wright 1500 [N. Mex.] (Ca--247678, T, T). NEW MEXICO: Eddy Co.: Cory s.n. [Carlsbad, Apr. 1924] (Tr); D. W. Lee 109 (W--1203666). County undetermined: Parry, Bigelow, Wright, & Schott 830, in part [Valley of the Rio Grande below Doñana] (W--56216); Wencurtin s.n. [5-2-1916] (Au). MEXICO: Coahuila: Johnson & Barkley 16205M (Au), 16208M (Au), 16212M (Au), 16247M (Au); Warnock & Barkley 14798M (Au). Nuevo León: Alonis, Johnson, & Barkley 16161M (Au), 16175M (Au); Frye & Frye 2376 (Hp); J. N. Weaver 1033 (W--2134239). Sinaloa: M. E. Jones 23243 (Ca--400867, En--6122, Gg--172668, N). Sonora: H. S. Gentry 1311 (Ca--646302, Fs, Ge, Gg--295540, I, Ka--94678, Me, Me, Mi, N, N, S, S); Rose, Standley, & Russell 12745, in part (N, W--635561). Tamaulipas: Painter & Barkley 14383 (Au). CULTIVATED: Texas: E. Hall s.n. [Austin] (W). LOCALITY OF COLLECTION UNDETERMINED: Edw. Palmer 168 (Sd--6781). MOUNTED CLIPPINGS: Pittonia 5: 137. 1903 (N).

VERBENA PUMILA f. ALBIDA Moldenke, Résumé Suppl. 7: 3, nom. nud. (1963), f. nov.

Haec forma a forma typica speciei corollis albis recedit.

This form differs from the typical form of the species in having white corollas.

The type of the form was collected by Robert Runyon (no. 2499) in open sandy ground, sandy loam soil, on Highway 96 at the edge of Kenedy County at the Willacy County line, at an altitude of 10 meters, Texas, on April 8, 1941, and is deposited in the Britton Herbarium at the New York Botanical Garden. Cory reports that his no. 53500 had the corolla-limb 2--3 mm. wide, but was growing "along with no. 53501 whose corolla-limb is 5 mm. or more wide; frequent on graded roads" in Pecos County, Texas. McKelvey 1931, cited below from Val Verde County, may actually hav been collected in Terrell County, since its labels merely say "between Langtry and Sanderson". Runyon describes the roots of this plant as fibrous, the bark pale-green, the leaves toothed or dissected, and the fruit a cylindric capsule, "frequent in sandy soil, the plants root at the lower nodes. He reports that his no. 2366 was collected on January 17, 1941, in the same locality as the type. About his no. 2359 he says "in the sandy region this plant roots freely at the nodes; it is frequent but not common."

Herbarium material has usually been misidentified and distributed as V. quadrangulata Heller. C. M. Rowell 4776, from San Patricio County, cited herein under V. pumila, bears a notation on its label reading "with pale purple to white corollas".

In all, 11 herbarium specimens, including the type, have been examined by me.

Citations: TEXAS: Bexar Co.: Kidder s.n. [San Antonio, 25 Mch.

1885] (Oa--10739). Cameron Co.: R. Runyon 2366 (N). Kenedy Co.: R. Runyon 2359 (N), 2492 (N--type, N--isotype, N--isotype). Kleberg Co.: Correll & Schweinfurth 15616 (Rf). Pecos Co.: Cory 53500 (Du--362506); Parks & Cory 5610 (Tr). Val Verde Co.: McKelvey 1931 (W--1580366, W--1581390).

VERBENA QUADRANGULATA Heller, Contrib. Herb. Franklin & Marshall Coll. 1: 84--85, pl. 6. 1895.

Synonymy: Helleranthus quadrangulatus (Heller) Small, Fl. Southeast. U. S., ed. 1, 1011 & 1337. 1903. Helleranthus quadrangulatus Small ex Prain, Ind. Kew. Suppl. 3: 87. 1908. Verbena pumila f. albiflora Standl., Field Mus. Publ. Bot. 4: 256. 1929. Verbena quadrangularis Heller ex Moldenke, Résumé Suppl. 2: 13, in syn. 1960 [not V. quadrangularis Vell., 1827]. Verbena guadrangularis Heller ex Moldenke, Résumé Suppl. 6: 10, in syn. 1963. Verbena quandrangulata Heller ex Moldenke, Résumé Suppl. 11: 7, in syn. 1964.

Bibliography: Heller, Contrib. Herb. Franklin & Marshall Coll. 1: 84--85, pl. 6. 1895; J. K. Small, Fl. Southeast. U. S., ed. 1, 1011 & 1337. 1903; Durand & Jacks., Ind. Kew. Suppl. 1: 451. 1906; Prain, Ind. Kew. Suppl. 3: 87. 1908; J. K. Small, Fl. Southeast. U. S., ed. 2, 1011. 1913; Standl., Field Mus. Publ. Bot. 4: 256. 1929; Stapf, Ind. Lond. 6: 431. 1931; Perry, Ann. Mo. Bot. Gard. 20: 245, 248--250, 311, 313--314, 339, & 356. 1933; Cory, Texas Agr. Exp. Sta. Bull. 550: 89. 1937; Moldenke, Prelim. Alph. List Invalid Names 26 & 48. 1940; Moldenke, Suppl. List Invalid Names 3. 1941; Moldenke in Lundell, Fl. Texas 3 (1): 17 & 34—35. 1942; A. M. T. Davis, Study Boscaje La Palma 62. 1942; Moldenke, Alph. List Invalid Names 25 & 50. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 13, 19, & 102. 1942; Moldenke, Alph. List Cit. 1: 91, 111, 125, 126, 130, 162, 176, 269, & 294. 1946; Moldenke, Phytologia 2: 165 (1946) and 2: 328 & 383. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 63. 1948; Moldenke, Wrightia 1: 230. 1948; Moldenke, Alph. List Cit. 2: 393, 398, 469, 492, 493, 496, 522, 527, 554, & 596 (1948), 3: 678, 679, 681, 682, 729, 792, 796, 797, 850, 881, 882, 914, 915, & 942 (1949), and 4: 990--992, 994, 1004, 1099, 1113, 1119, 1129, 1184, 1203, 1212, 1213, 1217, 1241, & 1294. 1949; Moldenke, Phytologia 3: 132. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 14. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 24, 33, & 199. 1949; Shinners, Spring Fl. Dallas 325. 1958; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 144. 1961; Moldenke, Résumé 30, 39, 298, 373, & 473. 1959; Moldenke, Résumé Suppl. 2: 13. 1960; Lewis & Oliv., Am. Journ. Bot. 48: 639—641. 1961; Moldenke, Phytologia 8: 123 (1961) and 8: 279 & 424. 1962; Moldenke, Résumé Suppl. 3: 7 (1962) and 6: 3 & 10. 1963; Moldenke, Phytologia 8: 472 (1963) and 9: 17, 24, & 62. 1963.

Illustrations: Heller, Contrib. Herb. Franklin & Marshall Coll. 1: pl. 6. 1895; Lewis & Oliv., Am. Journ. Bot. 48: 640, fig. 3. 1961.

Low annual herb, decumbent or prostrate to ascending, more or

less diffusely branched from the base; roots fibrous; stems prostrate to ascending, rooting at the lower nodes, hirsute; bark pale-green; leaves decussate-opposite, broadly ovate, 1--3 cm. long, cuneate at the base and contracted into a very short margined petiole, incised-pinnatifid or 3-cleft, with the lobes again incised, strigose-hirsute on both surfaces; spikes compact, sessile or nearly so, terminal; bractlets narrowly lanceolate, somewhat shorter than the calyx, hirsute,ciliate-margined; flowers inconspicuous, odorless, about 6 mm. long; corolla hypocrateriform, mostly white or whitish, often nearly white but tinged blue, bluish-lavender, or lavender, rarely pink with a white throat, pale-lavender, light-violet, or pale-blue, or even red, its tube slightly longer than the calyx, practically glabrous outside, the limb 2.5—3 mm. wide, the lobes emarginate; anthers unappendaged; ovary surmounted by a subhemispheric-angulate stylopodium; fruiting-calyx 5--6 mm. long, hirsute, particularly along the ribs, its lobes short, subulate-tipped; fruit cylindric, schizocarpous, constricted along the lines of cleavage, the cocci about 4 mm. long, surmounted by a smooth rather obtuse beak, shallowly reticulate-scrobiculate above, longitudinally striate and somewhat abruptly enlarged at the base; chromosome number: n = 10.

The type of this species was collected by Amos Arthur Heller (no. 1388, in part) in open grounds at both the northern and southern ends of the town of Corpus Christi, at an altitude of 10 to 35 feet, Nueces County, Texas, on March 5, 1894, where it was described as being "plentiful", and is deposited in the Britton Herbarium at the New York Botanical Garden, inscribed "Verbena quadrangularis". Material under this collection number on sheet no. 46200 in the Iowa State College herbarium is Cressa aphylla in the Convolvulaceae.

Heller (1895) says: "This most peculiar plant has the habit and general appearance of the species of Verbena which bear rather large and showy flowers, as V. bipinnatifida and V. Aubletia, but its very small flower at once throws it out of that group. Its most striking feature is the shape of its fruit, which is well shown in the accompanying plate. The crown of this curiously shaped seed is much like the four-angled fruit of certain species of Gaura and is hollow. Until the exact limit of Verbena seeds be known, it is provisionally placed under this genus although it is probably an undescribed genus." This doubt on the part of its original author would probably cause some literal interpreters of the International Rules of Botanic Nomenclature to maintain that the binomial has not been validly published by Heller and must be replaced!

It should be noted here that V. quadrangularis Vell. is a synonym of V. bonariensis L. The type of V. pumila f. albiflora was collected by Lydia E. Pagel (no. 2208) at San Antonio, Bexar County, Texas, in the spring of 1926, and is no. 580190 in the herbarium of the Chicago Natural History Museum.

Verbena quadrangulata has been collected in sandy, loose sandy,

rocky, clay, limestone, gravel, and grayish calcareous soil, in sandy loam, brownish sandy loam, and dry clay-loam, in loose sand, and on very fine sandy marl hardpan, on limey-clay hillsides, Catahoula tuff, plains, and sandy prairies, at altitudes of 10 to 1000 meters. Collectors have found it in vacant lots and waste places, woods, swales, and fields, mesquite brush and brushland, in waste or open ground, cleared mesquite scrub and open desert scrub, and on road shoulders or sandy road shoulders and caliche slopes, as well as along railroad rights-of-way, flowering from February to June and in November and December, fruiting from March to May and in November and December. In Texas it is described as inhabiting waste and open grounds, fields, and desert scrub, clay slopes, and sandy beaches, blooming from February to August, in the southern and western portions of the state from Pecos and Upton to Cameron and Wharton, north to Tarrant Counties.

In Cameron County Pammel says that "it blooms all winter", Wherry calls it "rare and little known", while Runyon says "frequent throughout this region [Cameron County], sometimes it covers small areas of ground", "abundant" or "very abundant throughout this region", and "an early spring annual with small white flowers". He also claims that it is "frequent on clay slopes and hilltops in Hidalgo and Starr Counties." Warnock reports it "frequent" in Crane County, and Hamby "more or less common" in Webb County. Cannon refers to it as "a weed in orange groves"; Crutchfield & Johnston say "weeds in sandy clay-loam along right-of-way"; McCart found it "in soil grading from pale orange sand to light brownish clay loam"; and Shinners (1958) writes "common in Rio Grande Plain, reported from Tarrant Co., far out of range, probably because of mislabelling of specimen, but possibly introduced". Jones, Rowell, & Johnston (1961) aver that it inhabits "pasture openings, on well-drained sandy or clayey loams and caliche", flowering in spring. F. B. Jones describes it as "locally abundant" in Kleberg County. The only common name reported is "verbena".

In regard to flower color, most collectors fail to mention this on their labels, but it is given as "white" on McKelvey 1786 and R. Runyon 1780, 2183, 2496, & 2561, as "whitish" on Cory 51369, R. Runyon 628, and Turner 4496, as "nearly white, tinged blue" on Lundell & Lundell 9803, as "nearly white, tinged lavender" on Lundell & Lundell 10124 & 10226, as "nearly white, tinged bluish-lavender" on Lundell & Lundell 9790, 9793, 10050, 10078, & 10141, as "pink with white throat" on Ecology Class Univ. Texas s.n. [Pearsall, 2-27-30], as "pale lavender" on C. L. Lundell 10692, as "light-violet, nearly white" on F. D. Jones 1773, and as "pale-blue" on Frye & Frye 2376 and C. L. Lundell 13621. Williams reports "flowers red or white". More field study is indicated before we can be sure if actual color forms are involved here or merely cases of fading due to age.

L. I. Davis, in a letter to me dated March 25, 1942, refers to two forms of this species -- one with the corolla only half as

wide as the calyx is long and the other form (from La Joya) with the corolla-limb 6--8 mm. wide and exactly equal to the calyx length. The soil in the two localities, he says, is entirely different.

Material of this species has been misidentified and distributed in herbaria under the names V. ambrosifolia Rydb., V. bipinnatifida Nutt., V. bracteosa Michx., V. canadensis (L.) Britton, V. canescens H.B.K., V. ciliata Benth., V. ciliata var. longidentata Perry, V. pumila Greene, and V. pumila Rydb.

On the other hand, the Fleetwood 3442, Gould & Hycka 8061, Mc Cart 7480, and C. M. Rowell 4776 & 5258, distributed as V. quadrangulata, are actually V. pumila Rydb., while R. Runyon 2359 & 2366 are V. pumila f. albida Moldenke. A. A. Heller 1385 is a mixture with V. ciliata var. longidentata Perry. Croft s.n. [San Diego, 1885] was apparently first identified as V. ciliata Benth., then as V. pumila Rydb., and finally as V. racemosa Eggert by Farwell. Edw. Palmer 1045 was annotated by Perry as "Aff. V. delticola Small" and a pencil notation on the sheet says "seed has commissure long-warty." E. J. Palmer 13562 was cited by Perry as V. pumila, based on St. Louis and Washington specimens, and I annotated the Berlin specimen as V. pumila also. The Washington specimen, however, has been examined by me and is cited below -- it has cocci with definite beaks! Similarly, Frye & Frye 2376 was regarded by me as V. pumila, based on Minden and Washington specimens. These two collections bear re-examination. The Lundell & Lundell 10226 collection should also be re-examined, since the Washington sheet of this number definitely does not have beaked cocci and is therefore cited by me as V. pumila. Without mature fruit it is almost impossible to distinguish these two species.

The Herb. Univ. Texas s.n. [3-2-1930], cited below as from Jim Wells County, Texas, may actually have been collected in San Patricio County since its label is inscribed merely "Alice--Mathis", but Dr. Tharp, in a letter to me, states "likely in Jim Wells County"; similarly, Tharp s.n. [4-19-35] and s.n. [Apr. 19, 1931], cited from Jim Wells County, may have been collected in Duval County, since the labels are merely inscribed "Alice--San Diego", although Dr. Tharp, in his letter to me, says "probably Jim Wells County". Hoglund s.n. [4-6-30], cited from Dimmit County, may have come from Zavala, since its label is inscribed merely "Carrizo Spr.--Crystal City"; Hoglund s.n. [4.6.30], cited from Medina County, may have originated in Frio, because its label is inscribed merely "Devine--Dilley"; McKelvey 1786, cited from Webb County, may have been gathered in Bexar County, as its label in inscribed "between Laredo & San Antonio". Tharp 5538, cited below as from Bee County, may have come from Karnes, since its label is inscribed merely "Kennedy--Beeville", although Dr. Tharp, in his letter to me, says "probably Bee County", and Tharp 5610, cited from Karnes County, may actually be from Bee or San Patricio Counties: its

label is inscribed "Kennedy--Portland".

Perry (1933) cites the following 22 additional specimens not as yet seen by me: TEXAS: Atascosa Co.: E. J. Palmer 1747 (E). Bexar Co.: Pagel 2208 (F); E. J. Palmer 2039 (G). Cameron Co.: Nealley s.n. [Brazos Santiago, 1889] (F. W). Frio Co.: Eggert s.n. [railroad north of Moore Station, 5 April 1901] (E). Kinney Co.: Trelease 101 (E). Kleberg Co.: High 75 (E). Nueces Co.: A. A. Heller 1388, in part (E--isotype, G--isotype); E. J. Palmer 1046 (G). Uvalde Co.: E. J. Palmer 23592 (E, G). Val Verde Co.: Orcutt s.n. [Devils River, 15 May 1913] (E). Webb Co.: Berlandier "1485 = 225" (G); Eggert s.n. [Laredo, 6 April 1901] (E, G); Orcutt 5542 (E), 5730 (E); J. Reverchon 3902 (E, G). MEXICO: Tamaulipas: Berlandier "3018 = 1518" (E). The Berlandier "1485 = 225", cited by her as from Webb County, may have come from elsewhere, since its label is inscribed "between Laredo and Bejar". Her "Canby 193" is cited below by me as Canby, Sargent, & Trelease 193; her "Nealley s.n." may possibly be the Nealley 114/369 cited below by me; her Croft 78 from "NY" is actually in the Columbia University Herbarium. She says "Verbena quadrangulata is an anomalous species often confused with V. pumila on account of the strong similarity in habit, but is perhaps more closely related to V. delticola, the only other known North American species with a tendency toward developing a nutlet with a beak. The style is enlarged at the base into a persistent subhemispherical body; hence, when the nutlets split apart they appear as if elongated at the apex into a beak-like appendage. Although the anthers are not glandular and the flowers not showy, the species seems to belong to the section Glandularia."

In all, 169 herbarium specimens, including the types of most of the names involved, and 6 mounted illustrations and clippings have been examined by me.

Citations: TEXAS: Bee Co.: Lundell & Lundell 10050 (Ld, N); Tharp 5538 (Au, W--1468817). Bexar Co.: Clare 755 (Hp); J. B. Davy 16 (Ca--25137); Metz 755 (I); E. D. Schulz 475 (W--1074921), 767, in part (W--1243198, Wi), s.n. [May 1921] (Wi), s.n. [so. S. A., 4-15-22] (Au), s.n. [9 mi. so. San Antonio] (Wi). Cameron Co.: M. Cannon s.n. [La Feria, February 25, 1926] (Mi), s.n. [Santa Rosa, February 7, 1927] (Mi, Mi); Cory 51369 (Sm); A. M. Davis s.n. [Olmito, Summer '41] (Au); C. L. Lundell 10692 (N, Rf, W--1926931); Nealley 114/369 (W); L. H. Pammel s.n. [Brownsville, Feb. 12, 1924] (Io), s.n. [Point Isabel, 2-25-29] (Io--114036), s.n. [Rio Hondo, 3-2-29] (Io--114036); R. Runyon 628 (Rr, W--1224221), 1780 (Rr), 2183 (Rr), 2496 (N, N); Schott s.n. [Rio Bravo del Norte, March 1852] (N); Small & Wherry 11903 (N); G. H. Thomas s.n. [Fort Brown] (N); Wherry s.n. [Brownsville, April 14, 1925] (Up). Cherokee Co.: J. F. Brenckle 47-379 (N). Crane Co.: B. H. Warnock 11693 (Rf).

Dimmit Co.: Cory 28067 (N); Hoglund s.n. [Carrizo Spr.--Crystal City, 4.6.30] (Au). Duval Co.: Croft 78 (C, Pa), s.n. [San Diego, 1885] (Mi); M. C. Johnston 54106 (Au--122587); Lewis & Oliver 5409 (Nb); Ramos, Sandoval, & McCart 8007 (Ok). Frio Co.: Ecology Class Univ. Texas s.n. [Dilley, 2.27.30] (Au), s.n. [Pearsall, 2-27-30] (Au); Herb. Univ. Texas s.n. [Dilley, 2-27-1930] (Au), s.n. [Pearsall, 2-27-30] (Au); C. L. Lundell 13621 (Sm). Goliad Co.: C. B. Williams 49 (Au). Hidalgo Co.: Clover 596 (Mi, N); Fleetwood 3200 (Au--180075); Lundell & Lundell 9803 (Ld, N, W--1888830); R. Runyon 2561 (N); B. L. Turner 4496 (Au--168766); Mrs. E. J. Walker 41 (Au, N). Jim Hogg Co.: Salazar, Santos, & McCart 33 (Ok, Ok); Sanchez, Rodriguez, & McCart 8311 (Ok); Tharp, Johnson, & Webster 48-71 (N, St). Jim Wells Co.: Herb. Univ. Texas s.n. [Alice--Mathis, 3-2-1930] (Mi); Lundell & Lundell 10078 (Ld, N); Tharp s.n. [Alice--San Diego, Apr. 19, 1931] (Au), s.n. [Alice--San Diego, 4-19-35] (Mi). Karnes Co.: Tharp 5610 (W--1468818). Kinney Co.: Canby, Sargent, & Trelease 193 (W--369717); Cory 28994 (N). Kleberg Co.: M. C. Johnston 5441 (Au--122588, St), 53253.15 (Au--122589); F. B. Jones 1773 (Ww); R. Runyon 4284 (Mg, N). La Salle Co.: Botello 49 (Ok); Cory 28548 (N); Lundell & Lundell 10141 (Ld, N). Maverick Co.: Havard s.n. [Eagle Pass, April '83] (W--218871, W--250657). McMullen Co.: Thompson & Graham 61 (Au--123196). Medina Co.: Hoglund s.n. [Devile--Dilley, 4.6.30] (Au). Nueces Co.: A. A. Heller 1385, in part (Pl--72008), 1388, in part (C--isotype, Ca--25169--isotype, Ca--104864--isotype, Es--isotype, Io--38745--isotype, Mi--isotype, N--type, N--photo of isotype, Pl--22606--isotype, Se--79860--isotype, Tu--isotype, Ur--isotype, W--48059--isotype, Z--photo of isotype); F. B. Jones 1718b (Ww); S. M. Tracy s.n. [Corpus Christi, 4/6/1905] (Tr, Tr). Pecos Co.: Parks & Cory 18351 (Tr). San Patricio Co.: F. B. Jones 2833 (Ww); E. D. Schulz s.n. [4/22/1938] (Wi); Tharp s.n. [Mathias, 3-2-1930] (N). Starr Co.: Alvarez, Guajardo, Salazar, & McCart 8042 (Ok); Lundell & Lundell 9790 (Ld, N, W--1887592), 9793 (N); McCart 7234 (Ok); Ramos, Sandoval, Salazar, & McCart 7879 (Ok); Tharp, Johnson, & Webster 48-73 (Au--122596, N). Tarrant Co.: Parks & Cory 11278 (Tr). Upton Co.: Lundell & Lundell 10226 (Ld, N, W--1888903). Uvalde Co.: Dobie s.n. [Uvalde, Apr. 13, 1931] (Au); M. E. Jones 28298 (Ca--479296, Du--239730), 28998 (Bm), 98298 (Gg--237850); E. J. Palmer 13562, in part (W--1603456), 33592 (N); Tharp & Havard 49346 (Au--122591). Val Verde Co.: Small & Wherry 12010 (N). Webb Co.: Alvarez, Guajardo, Salazar, & McCart 7632 (Ok); Blair & al. 48-498 (Au--122584); Cantu, Chapa, & McCart 14 (Ok); C. K. Dodge 154 (W--841668); H. J. Hamby 515 (Ar-206561); McCart 7150 (Ok, Ok), 7361 (Ok); McKelvey 1786 (W--

1581389); Edw. Palmer 1046 (Pa); J. Reverchon 3902 (N, Po--64699, W--501157); Shute 51-1714 (Au--122506). Wharton Co.: J. K. Small s.n. [near Wharton, April 12, 1925] (H--43734, Hi--7905, W--1738993, We); Small & Wherry 11824 (N, N). Willacy Co.: J. F. Brenckle 47-465 (N); Cory 51487 (Sm); Lewis & Oliver 5426 (Nb). Zapata Co.: H. J. Hamby 554 (Ar--206670); Herrera & McCart 7699 (Ok); Lundell & Lundell 10124 (Ld, N); McCart 7206 (Ok); Ramos, Sandoval, Salazar, & McCart 7848 (Ok). Zavala Co.: Cory 43814 (Au). County undetermined: Parks & Cory 17841 (Tr--16203). MEXICO: Nuevo León: Frye & Frye 2376 (Se--65763, W--1790996); Edw. Palmer 1045 (W--56162); Webster & Barkley 14508 (W--2134278), 14508a (Au, N). Tamaulipas: Crutchfield & Johnston 5171a (Au--178530). MOUNTED ILLUSTRATIONS: Heller, Contrib. Herb. Franklin & Marshall Coll. 1: pl. 6. 1895 (W, W). MOUNTED CLIPPINGS: Heller, Contrib. Franklin & Marshall Coll. 1: 84--85. 1895 (W, W).

VERBENA RACEMOSA Eggert, Torreya 2: 123. 1902.

Synonymy: Verbena pulchella Greene, Pittonia 5: 136. 1903 [not V. pulchella Sweet, 1829, nor Hort., 1841].

Bibliography: Eggert, Torreya 2: 123. 1902; Greene, Pittonia 5: 136. 1903; Prain, Ind. Kew. Suppl. 3: 187. 1908; Perry, Ann. Mo. Bot. Gard. 20: 312, 332--333, & 356. 1933; Dermen, Cytologia 7: 161--166 & 168, fig. 9 & 25. 1936; Cory, Texas Agr. Exp. Sta. Bull. 550: 89. 1937; Moldenke, Prelim. Alph. List Invalid Names 48. 1940; O. E. Sperry, Sul Ross State Teach. Coll. Bull. 22: 41. 1941; Moldenke in Lundell, Fl. Texas 3 (1): 19 & 44--45. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 13, 14, & 102. 1942; Moldenke, Alph. List Invalid Names 49. 1942; Schnack, Anal. Inst. Fitotéc. Sta. Catalina 4: 18. 1942; Schnack & Covas, Darwiniana 6: 471. 1944; Darlington & Janaki Ammal, Chromosome Atl. 270. 1945; Moldenke, Phytologia 2: 165. 1946; Moldenke, Alph. List Cit. 1: 125--127 (1946) and 2: 478 & 526. 1948; Moldenke, Wrightia 1: 234. 1948; Moldenke, Castanea 13: 112. 1948; Moldenke, Am. Wild Fls. 292 & 450. 1949; Moldenke, Alph. List Cit. 3: 682, 741, 769, 784, 843, 857, 873, 874, 953, 954, 965, & 966 (1949) and 4: 989, 1004, 1007--1009, 1198, 1212, 1213, & 1294. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 24, 25, 33, & 199. 1949; Mc Dougall & Sperry, Pl. Big Bend Natl. Park 146. 1951; Moldenke, Phytologia 5: 330. 1958; Moldenke, Am. Midl. Nat. 59: 349 & 354. 1958; Moldenke, Résumé 30, 31, 39, 373, & 473. 1959; Lewis & Oliv., Am. Journ. Bot. 48: 638--641, fig. 4. 1961; Moldenke, Phytologia 8: 121, 123, & 124 (1961) and 8: 177, 212, & 437. 1962; Moldenke, Résumé 3: 7 (1962) and 5: 4. 1962; Moldenke, Phytologia 9: 16--18, 27, 118, & 202 (1963) and 9: 386. 1964.

Illustrations: Dermen, Cytologia 7: 163, fig. 9, & 165, fig. 25. 1936; Lewis & Oliv., Am. Journ. Bot. 48: 640, fig. 4. 1961.

Usually a small, low, annual herb, hirsute, prostrate to spreading-erect or in erect clumps; stems several from a common base, ascending-erect, branched at the base, pubescent, sometimes bloom-

ing when only 2.5 cm. tall; branches procumbent or decumbent to ascending-erect, usually about 25 cm. long; leaves decussate-opposite, small, firm, the lower ones petiolate, the upper sessile; leaf-blades oval or ovate in outline, about 2 cm. long and 1.5 cm. wide, bipinnatifid or trifid, varying to deeply twice 3-parted, with the segments deeply cleft, the ultimate segments linear, somewhat pubescent or hirtellous on both surfaces; spikes terminating the branches, short-pedunculate or subsessile, cylindric, elongating to 4 cm. but still rather dense at maturity; bractlets lanceolate, 4--7 mm. long, scarcely as long as the calyx, acuminate at the apex, ciliate along the margins; calyx 4--6 mm. long, usually surpassing the bractlets, sparsely glandular-hirtellous or rough-hairy, its teeth short, shorter than the tube, acute- or linear-subulate; corolla white or essentially so, sometimes light-blue, lavender-tinted, very pale-lavender, or light-lavender, persistent, about 1 cm. long, its tube 7--9 mm. long, puberulent or glabrous on the outer surface, its limb 2--6 mm. wide; cocci 2--3 mm. long, spreading at the base when mature, reticulate-scrobiculate almost to the base, the commissural faces muricately scabrous; chromosome number: x = 5; n = 10 (Lewis & Oliver) or 2n = 30 (Dermen).

The type of this species was collected by Heinrich Karl Daniel Eggert in low sandy ground in valleys near Sierra Blanca, El Paso County, Texas, on May 15, 1901, and is deposited in the Britton Herbarium at the New York Botanical Garden. Eggert says "In low places on sandy soil, from the vicinity of El Paso to Martin County, Texas. April to June. Verbena racemosa is related to Verbena bipinnatifida with which it has been associated. It differs from the latter species in the narrow leaf-segments and the smaller, pale and persistent corollas. It hybridizes with Verbena Wrightii." This hybrid has not as yet been recognized by me. The only hybrids known to me which involve V. racemosa are with V. canadensis (L.) Britton [=xV. ferax Moldenke] and with V. tenuisecta Briq. [=xV. kondai Moldenke].

The type of V. pulchella of Greene was collected by Samuel Mills Tracy and Franklin Sumner Earle (no. 106a) in the foothills of the Davis Mountains, Jeff Davis County, Texas, in April.

In Texas V. racemosa is said to inhabit deserts, low valleys, and foothills, blooming from January to June, the winter form often blossoming when only an inch tall, in the western and central portions of the state, from El Paso to Brewster to La Salle, Bexar, and Houston Counties. Collectors record it from reddish, limestone, and alluvial soil, foothills and low foothills, valleys and mesa margins, rocky limestone valleys, deserts, borrow pits, and creek floodplains. They have found it on desert or sandy flood flats, dry flats, plains, rocky hillsides, desert mountains, sand and gravel bars, and the shoulders of highways, along draws and ditches, sandy roadsides, and among rock and gravel in xerophytic canyons, at altitudes of 2200 to 8500 feet, flowering and fruiting from December to July. Whitehouse reports

that it often forms "large plants 2 feet broad in gravel and sand bed on rocky slopes" in Pecos County; McVaugh calls it "abundant in level grassy bottoms, rocky limestone hills, thorn shrub-grassland community"; Tharp found it "behind spreader dumps [and dams] on slopes and in valleys"; Warnock & McBryde refer to it as "infrequent" in Terrell County. Warnock says that it is "infrequent" in Brewster County, "frequent along highways" in Pecos County, "frequent" in Val Verde County, and "infrequent but widespread along highways in gypsum soil" in Reeves County. Cory 53500 bears a label reading "corolla-limb 2--3 mm. wide; frequent on graded road with no. 53501 in which the corolla-limb is 5 mm. broad or more." O. E. Sperry 493 represents the winter form, the plants actually only an inch or so tall and in full flower in January.

As to the color of the corollas, most collectors who mention it at all claim it to be white or essentially white; on D. S. Correll 20699 it is said to be "whitish", on Warnock & McBryde 14750 "mostly white", on Whitehouse 19633 "nearly white, lavender-tinted", on McVaugh 7940 "very pale-lavender, just off white", on Warnock 47011 "white to light-lavender", and on McVaugh 7951 "varying to pink or blue". Warnock T.46 is said by the collector to have been "slightly white-flowered", whatever that means!

Lewis & Oliver (1961) say "Chromosome counts are recorded previously for 5 of the species listed and agree with our results excepting 2n = 30 for V. racemosa Eggert (Dermen, 1936). Our number of n = 10 suggests 4x and 6x races for the taxon, or, alternately that the binomial refers to 2 distinct species." I might add a third possibility: Dermen's material, which I have not seen, may have been misidentified. Lewis & Oliver's material has been checked by me.

Material of V. racemosa has been misidentified and distributed in herbaria under the names V. ambrosifolia Rydb., V. bipinnatifida Nutt., V. ciliata Benth., V. pubera Greene, V. pumila Rydb., V. pumila f. albiflora Standl., and V. wrightii A. Gray. On the other hand, the O. E. Sperry T.1072, distributed as V. racemosa, is actually V. ambrosifolia Rydb., Hamby 500 and R. F. Smith M.464 are V. ciliata Benth., R. F. Smith M.10 is V. delticola Small, and Cory 53502, Moore & Moore 4, and B. H. Warnock T.45 are V. wrightii f. albiflora Moldenke. Parry, Bigelow, Wright, & Schott 830 is a mixture with V. pumila Rydb.

The McKelvey 1914 collection, cited below as from Val Verde County, Texas, may actually have been gathered in Brewster County, since its label merely reads "between Langtry & Marathon". H. R. Reed 34064 has no locality of collection indicated on its label, but V. L. Cory, in a letter to me dated November 15, 1943, says that it was probably collected in Pecos County — "the plant grows along the highway from Sheffield to Fort Stockton." Tharp & Havard 49294 may have been collected in Culberson County. Cory 34065

has "H. N. Moldenke" inscribed on its label as collector, but this is certainly erroneous.

Perry (1933) cites the following 7 additional specimens not as yet seen by me: TEXAS: El Paso Co.: Eggert s.n. [low valleys near Sierra Blanca, 15 May 1901] (E--isotype, G--isotype); Orcutt 6184 (E). Jeff Davis Co.: Tracy & Earle 106a (F, G). Upton Co.: Cory 664 (G). NEW MEXICO: County undetermined: C. Wright 1501 (G). Her "Parry, Bigelow, Wright & Schott in part" is the 830, in part, cited by me below; the Wright 1498 which she cites from "NY" is actually in the Torrey Herbarium. She says "Fine pubescence, short calyx-teeth, small leaves, and elongated profusely fruiferous spikes are the distinctive characters of this species. It is probably a close relative of V. ciliata."

In all, 129 herbarium specimens, including type material of all the names involved, have been examined by me.

Citations: TEXAS: Brewster Co.: D. S. Correll 20699 (Ld); Cory 30083 (N), 30620 (N), 31653 (N), 43930 (Au), 53209 (Ca--735349, Du--320340, Sm, W--1946557); Cottam 10305 (Fs); Goodman & Waterfall 4574 (Ok, St); Rose-Innes & Warnock 527 (Au, N), 2430 (Au); O. E. Sperry 493 (Fs), 614 (W--1699350), 625 (Om, W--1699359), 1380 (Om, W--1731035), 1734 (Om), T.1071 (Ca--882804); Steiger 1275 (N); Tharp & Havard 49307 (Au--122606); B. H. Warnock 418 (Au), 20105 (Au), 47011 (Rf), T.45 (N, N); Warnock & Turner 7654 (Rf, Rf); Waterfall 15852 (St); Whitehouse 19633 (Mi, N). Culberson Co.: O. E. Sperry T.128 (Om, W--1679251). El Paso Co.: Eggert s.n. [15 May 1901] (N--type). Glasscock Co.: Cory 42070 (Au, N). Houston Co.: Molby 7224 (Au). Hudspeth Co.: Tharp & Havard 49294 (Au--122607). Jeff Davis Co.: Cory 52245 (N); Tracy & Earle 106a (Au, Cm, N, Tr, W--441809). LaSalle Co.: Cory 28553 (N). Montgomery Co.: Havard s.n. [Stockton, June 1881] (W--225358). Pecos Co.: Cory 52155 (Sm), 53500 (N, W--1925405), 53501 (N), 53502 (N), s.n. [4-9-1936] (Md); Hinckley 4675 (N); Lundell & Lundell 10190 (Ld, N, W--1887636), 10206 (Ld, N, Rf); R. McVaugh 7940 (Ar--233924, Au--178248, Du--355381, Mi); Nelson & Nelson 4985 (W--1974032); H. R. Reed 34064 (N, N); Ripley & Barneby 4188 (Gg--301325, N); Tharp 43-805 (Au, N), 43-806 (Au, N, Ok), 43-807 (Au, N, St), 43-808 (Au, Ca--882806, N, N, W--1888993); Tharp & Havard 49359 (Au--122608); B. H. Warnock 46 (W--1730930), 7692 (Rf, Rf), 13862 (Rf), 46135 (Ok, Rf, S), 46136 (Au, N), T.46 (Au, Au); Whitehouse 19536 (Ca--771833, W--1973847). Presidio Co.: R. McVaugh 7951 (Mi); Steiger 649 (N). Reeves Co.: Correll & Johnston 18576 (Rf); Cory 31309 (N), 52133 (Sm); Earle & Tracy 106 (N); Nelson & Nelson 4985 (Au, Du--331380, Ka), 4995 (Au, Du--331381); Roane 28 (Ar--256371); E. Wall 5, in part (S); B. H. Warnock 8593 (Rf). Terrell Co.: B. H. Warnock 2100 [Parks

& Turner 66] (Au--122575); Warnock & McBryde 14750 (Au--123266). Upton Co.: Cory 5587 (Po--213639). Val Verde Co.: McKelvey 1914 (W--1581343); B. H. Warnock 1400 [Parks & Turner 183] (Au--122576). County undetermined: Schott s.n. [roadside between Indianola & San Antonio] (N). NEW MEXICO: San Miguel Co.: M. L. Campbell s. n. [Pecos Valley, Mar. 1, 1917] (Gg--31296). County undetermined: C. Wright 1498 (T), 1501 (T). MEXICO: Coahuila: Lewis & Oliver 5416 (Nb); Warnock & Barkley 14853M (Au). Nuevo León: Frye & Frye 2425a (Se--65655, W--1791003); Painter, Lucas, & Barkley 14281 (Au). LOCALITY OF COLLECTION UNDETERMINED: Cory 34065 (Ur); Parry, Bigelow, Wright, & Schott 830, in part [Valley of the Rio Grande below Doñana] (W--56216).

VERBENA RADICATA Moldenke, Phytologia 9: 184. 1963.

Synonymy: Verbena radicans Gill. & Hook. in Hook., Bot. Misc. 1: 170. 1829 [not V. radicans Moench, 1794]. Verbena radicans Gill. ex R. A. Phil., Anal. Univ. Chil. 35: 190--191. 1870. Glandularia radicans (Gill. & Hook.) Schnack & Covas, Darwiniana 6: 475. 1944.

Bibliography: Moench, Meth. 369. 1794; Steud., Nom. Bot., ed. 1, 874. 1821; Hook., Bot. Misc. 1: 170. 1829; Maund, Bot. Gard. 5: pl. 106 ["422"]. 1834—1835; G. Don in Loud., Hort. Brit. Suppl. 2: 680. 1839; Steud., Nom. Bot., ed. 2, 2: 750. 1841; D. Dietr., Syn. Pl. 3: 603. 1843; Walp., Repert. 4: 24. 1845; Schau. in A. DC., Prodr. 11: 552. 1847; C. Gay, Hist. Fis. Chile Bot. 5: 12. 1849; R. A. Phil., Anal. Univ. Chil. 35: 190--191. 1870; F. Phil., Cat. Pl. Vasc. Chil. 221. 1881; Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Sanzin, Anal. Soc. Cientif. Argent. Buenos Aires 88: 97, 98, 124, 127, & 134. 1919; Stapf, Ind. Lond. 6: 431. 1931; L. H. Bailey, Cat. Florists Handl. Verbenac. mss. 1935; H. S. Marshall, Kew Bull. Misc. Inf. 1936: 94. 1936; Beale, Journ. Genet. 40: 338. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42, 44, & 102. 1942; Schnack, Anal. Inst, Fitotéc. Sta. Catalina 4: 19. 1942; Schnack & Covas, Darwiniana 6: 475. 1944; Cabrera, Bol. Argent. Soc. Bot. 1: 67. 1945; Darlington & Janaki Ammal, Chromosome Atl. 270. 1945; Schnack & Covas, Darwiniana 7: 71, 72, 74, & 75, pl. 4B. 1945; Ind. Taxonom. 1 (14-16): 6. 1945; Moldenke, Alph. List Invalid Names Suppl. 1: 10. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 102, 107, & 199. 1949; Moldenke, Phytologia 3: 290 (1950) and 3: 467. 1951; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 70. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 101. 1953; Moldenke, Résumé 122, 128, 224, 296, & 473. 1959; T. H. Everett, New Illustr. Encycl. Gard. 13: 2406. 1960; Moldenke, Résumé Suppl. 2: 13. 1960; Moldenke, Phytologia 8: 123 (1961) and 8: 203 & 204. 1962; Moldenke, Résumé Suppl. 3: 40 (1962) and 7: 5—7 & 9. 1963; Moldenke, Phytologia 8: 472 (1963), 9: 12, 70, 184, & 192 (1963), and 10: 148. 1964.

Illustrations: Sanzin, Anal. Soc. Cientif. Argent. Buenos Aires 88: 127. 1919; Schnack & Covas, Darwiniana 7: pl. 4B. 1945.

Procumbent or creeping suffruticose perennial; stems rooting at the nodes; leaves decussate-opposite, somewhat fleshy; leaf-blades trifid, completely glabrous on both surfaces, the segments again trifid, the lobes oblong-linear; inflorescence spikes short, terminal, subcapitate; bractlets half as long as the calyx, long-ciliate on the margins; flowers fragrant; calyx about 5 mm. long, short-pubescent on the outer surface; corolla hypocrateriform, varying from blue or bluish-lilac to lilac, violet, or even white, its tube about twice as long as the calyx, puberulent on the outer surface, the limb about 5 mm. wide; chromosome number: 2n = 10.

The type of this little-known species was collected by John Gillies in the Andean valleys near Mendoza, at an altitude of 7000 to 8000 feet, Mendoza, Argentina, and is deposited in the herbarium of the Royal Botanic Gardens at Kew. Hooker says that "This has much the habit of V. microphylla of Humboldt and Kunth, but the leaves are larger, more divided, wholly glabrous, of a yellowish colour when dry, and the spikes are terminal, not axillary. It is remarkably procumbent, and throws out roots abundantly from the lower part of the woody stem." Schauer (1847) says virtually the same: "Habitu prope accedit ad V. microphyllam H. B. Kth., sed folia majora magisque divisa glaberrima, exsiccata flavicantia," and "Vix diversa a sequenti [V. tenera]." Gay (1849) says "Especie muy distinta de las de esta seccion por ser enteramente glabra. Se halla en las cordilleras entre Santiago y Mendoza."

The species has been collected in sandy playas, on rocky ground, and on montane plains at altitudes of 6000 to 8000 feet, flowering in November to January. As to flower color, Sparre 1329 is said to have had blue flowers, Sparre 1035 bluish-lilac, Lillo 8644 violet, and Sanzin 666 white flowers. The species is said to have been introduced into cultivation in England in 1832, flowering there in summer to autumn, "almost hardy, but cuttings should be wintered in frames". Bailey (1935) reports that its seeds are offered to the trade by the Royal Horticultural Society. Everett (1960) describes the plant as "a vigorous grower that forms a perfect flat carpet of greenery studded with heads of lilac flowers. It is hardy, in sheltered places, as far north as Washington, D. C. This kind is native to the Andes of South America." A common name recorded for it is "smooth verbena".

The name, V. radicans, of Moench, is a synonym of and actually only a new name for V. supina L., apparently proposed by Moench merely because he did not like Linnaeus' epithet. Yet it invalidates the similar binomial proposed by Gillies and Hooker 35 years later. The Loud., Hort. Brit. Suppl. 2: 680 (1839) reference is often credited to W. Baxter, but apparently should be credited to G. Don. The Maund, Bot. Gard. 5: pl. 106 ["422"] (1834--35) color illustration identified and often cited as V. radicans, actually represents V. berterii Spreng.

Herbarium material of V. radicata has been misidentified and

distributed in herbaria as V. santiaguensis (Covas & Schnack) Moldenke. On the other hand, the Collector undesignated s.n. [H. H. Loc. 1837], distributed as V. radicans, is actually V. berterii Spreng., while Carette 339 is V. sulphurea var. intermedia Kuntze.

In all, 9 herbarium specimens, including type material of all the names involved, have been examined by me.

Citations: ARGENTINA: Catamarca: Sparre 1035 (S). Mendoza: Carette 339, in part (N); Gillies s.n. [Mendoza] (Lu—isotype); Sanzin 666 [Herb. Osten 12811] (N, Ug). Tucumán: Lillo 8644 [Herb. Osten 8471] (N, Ug); C. C. Olrog s.n. [P. Olrog 95] (Og); Sparre 1329 (S).

VERBENA RADICATA var. GLABRA (Hicken) Moldenke, Phytologia 9: 184. 1963.

Synonymy: Verbena radicans var. glabra Hicken, Darwiniana 1: 66. 1923.

Bibliography: Hicken, Darwiniana 1: 66. 1923; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 44 & 102 (1942) and [ed. 2], 107 & 199. 1949; Moldenke, Résumé 128 & 473. 1959; Moldenke, Phytologia 9: 184. 1963; Moldenke, Résumé Suppl. 7: 6. 1963.

This variety differs from the typical form of the species in having the outer surface of the calyx glabrous or almost glabrous with very few short scattered hairs, the calyx-teeth less ciliate, the bractlets glabrous except for the very minutely ciliate margins, and the anther-glands abortive and difficult to discern. The calyx is to 12 mm. long and the corolla 22—25 mm. long, glabrous on the outer surface.

The type of the variety was collected by Cristóbal María Hicken (no. 32) at Arroyo Calabozo, Argentina, in December, 1911. The variety is known to me only from the original description.

VERBENA RAMBOI Moldenke, Phytologia 3: 427—428. 1951.

Bibliography: Moldenke, Phytologia 3: 427—428 & 454. 1951; Moldenke, Biol. Abstr. 25: 3051. 1951; G. Taylor, Ind. Kew. Suppl. 12: 149. 1959; Moldenke, Résumé 111 & 473. 1959.

Herb, apparently about 30 cm. tall; stems apparently simple, erect, acutely tetragonal, sulcate between the angles toward the apex, more or less scattered-pilose especially on the often margined angles, the hairs between the angles much more minute and appressed, those on the angles white, spreading or reflexed; nodes not annulate; principal internodes 1.5—2 cm. long; leaves decussate-opposite, sessile or practically so; leaf-blades rather grayish-green on both surfaces, chartaceous, elliptic-lanceolate in outline, 2—4.5 cm. long, 5—10 mm. wide, attenuate-acute at the apex, long-attenuate to the base, coarsely incised or incised-serrate with 3—5 teeth on each side at the middle broader portion of the leaf (the larger and lowest lobe-like teeth often again toothed), very sparsely scattered-pilose above with stiff white appressed hairs, more densely so on the larger venation beneath; midrib slender, impressed above, prominent beneath; secondaries slen-

der, about 3 per side, impressed above, prominulous beneath, not extending directly to the tips of the teeth or lobes, but branching early, with the branches extending into the teeth; veinlet reticulation indiscernible on both surfaces; inflorescence terminal, composed of 3 abbreviated spikes; peduncles slender, 1 cm. long or less, acutely tetragonal, whitish-hirsutulous; floriferous portion of the spikes subcylindric, 1--2 cm. long, about 1 cm. wide during anthesis, very densely many-flowered; bractlets lanceolate-ovate, about 5 mm. long, 1 mm. wide at the base, long-attenuate at the apex, subulate-tipped, glabrate except for the long-ciliate margins; calyx cylindric, about 8 mm. long, conspicuously 5-ribbed and white-hirsutulous on the ribs, the rim irregularly subulate-toothed.

The type of this species was collected by my good friend and colleague, Padre Balduin Rambo (no. 25787) -- in whose honor it is named -- in bushy fields at Fazenda Santa Cecilia, near São Gabriel, Rio Grande do Sul, Brazil, on January 15, 1944, and is deposited in the herbarium of the Colegio Anchieta at Porto Alegre, Brazil. In all, 2 herbarium specimens, including the type, and 2 mounted photographs have been examined by me.

Citations: BRAZIL: Rio Grande do Sul: Rambo 25787 (N--isotype, N--photo of type, Rb--type, Z--photo of type).

VERBENA RAMULOSA R. A. Phil., Anal. Univ. Chile 90: 610. 1896.

Bibliography: R. A. Phil., Anal. Univ. Chile 90: 610. 1896; Durand & Jacks., Ind. Kew. Suppl. 1: 451. 1906; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42 & 102 (1942) and [ed. 2], 102 & 199. 1949; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 60 & 62, fig. 3. 1951; Moldenke, Résumé 122 & 473. 1959; Muñoz Pizarro, Espec. Plant. Descr. Philippi 111. 1960.

Illustrations: Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 62, fig. 3. 1951.

Low branched subshrub, covered with appressed white hairs, somewhat canescent; branches about 3 cm. long, 3 mm. in diameter at the base; branchlets 3--6 cm. long, sulcate, one produced at each node; principal internodes 6--10 mm. long; leaves minute, very much crowded, obovate in outline, about 5 mm. long and 4 mm. wide, deeply 3-lobed, the lobes rounded, the central one much wider than the lateral ones; the single midrib not prominent; spikes capitate, subsessile, the heads rather dense but few-flowered, usually 8--10-flowered; bractlets lanceolate, green, almost equaling the calyx; calyx reddish, about 3 mm. long, its teeth triangular; corolla-tube pale-rose, twice as long as the calyx.

The type of this little-known species was collected by José Mȯnreal Marin near Angostura de Peine, O'Higgins, Chile, on November 1, 1886, and is deposited in the herbarium of the Museo Nacional de Historia Natural at Santiago, Chile. Philippi says "Se aproxima mucho a la V. microphylla Kth. por sus hojas pequeñas i las espigas casi sésiles, pero las hojas de esta tienen 3 a 5 líneas (5 a 11 milímetros) de largo, i tienen a menudo su lóbulo med-

iano trífido i los laterales bífidos, i su cáliz mide 3 líneas o sea 6 1/2 milímetros, siendo pues del doble largo que él de la V. ramulosa."

Acevedo de Vargas (1951) suggests that the Collector undesignated s.n. specimen cited below may actually be a clastotype. Thus far, only 2 photographs, including a phototype, have been examined by me.

Citations: CHILE: O'Higgins: Collector undesignated s.n. [Herb. Mus. Nac. Hist. Nat. Chile 54731] (N--photo); Marin s.n. [Herb. Mus. Nac. Hist. Nat. Chile 42511] (N--photo of type).

VERBENA RECTA H.B.K., Nov. Gen. & Sp. Pl. 2: 277. 1818 [not V. recta Caesalp., 1583, nor Dodon., 1583, nor Trag., 1624].

Synonymy: Verbena recta Humb. ex Spreng. in L., Syst. Veg., ed. 16, 2: 748. 1825. Verbena recta Humb. & Bonpl. ex Steud., Nom. Bot., ed. 2, 2: 750. 1841. Verbena recta Humb. & Kunth ex D. Dietr., Syn. Pl. 3: 600. 1843. Verbena recta Kunth ex Schau. in A. DC., Prodr. 11: 546, in syn. 1847. Verbena caroliniana f. recta (Kunth) Loes. in Fedde, Repert. 9: 362. 1911. Verbena caroliniana var. recta (Kunth) Loes. in Fedde, Repert. 9: 362. 1911.

Bibliography: H.B.K., Nov. Gen. & Sp. Pl. 2: 277. 1818; Steud., Nom. Bot., ed. 1, 874. 1821; Steud., Nom. Bot., ed. 2, 2: 750. 1841; D. Dietr., Syn. Pl. 3: 600. 1843; Walp., Repert. 4: 20. 1845; Schau. in A. DC., Prodr. 11: 546. 1847; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Loes. in Fedde, Repert. 9: 362. 1911; Perry, Ann. Mo. Bot. Gard. 20: 247, 260, 271—272, & 356. 1933; Moldenke, Prelim. Alph. List Invalid Names 45. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 19 & 102. 1942; Moldenke, Alph. List Invalid Names 46. 1942; Moldenke, Alph. List Cit. 1: 53, 104, 144, & 203 (1946) and 2: 356, 393, 540, 573, & 607. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 44. 1948; Moldenke, Alph. List Cit. 3: 685, 696, 714, 766, 829, 831, & 876 (1949) and 4: 1072, 1171, 1233, & 1303. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 33, 164, & 199. 1949; Moldenke, Sp. Subsp. Cont. Mold. Set 45 [5]. 1951; Moldenke, Inform. Mold. Set 46 Spec. 4. 1951; Moldenke, Phytologia 3: 467. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; Rzedowski, Anal. Esc. Nac. Cienc. Biol. 8: 105. 1954; Moldenke, Inform. Mold. Set 49 Spec. 3. 1954; Moldenke, Résumé 40, 224, 361, & 473. 1959; Moldenke, Résumé Suppl. 2: 13 (1960), 4: 18 (1962), 6: 8 (1963), and 7: 9. 1963; Moldenke, Phytologia 8: 487 & 488 (1963), 9: 198 (1963), and 10: 101, 140, & 141. 1964; Moldenke, Résumé Suppl. 8: 6. 1964.

Low, erect, perennial herb; stems erect, 1 to 2 feet tall, reddish, branched, 4-angled, hispidulous or more or less sparsely pilosulous; leaves decussate-opposite; petioles short, margined; leaf-blades thin-textured, lanceolate-oblong to ovate-lanceolate or ovate, 4--9 cm. long, 2--2.5 cm. wide, acute at the apex, sharply and somewhat irregularly serrate or serrate-dentate along the margins, cuneately narrowed into the petiole at the base, strigil-

lose on both surfaces, minutely pustulate above, reticulately veined; spikes numerous, congested at the apices of the stems and branches, short-cylindric, usually densely flowered but not strict, 4--7.5 cm. long, not much elongating after anthesis; bractlets ovate-lanceolate, equaling or a little shorter than the calyx, 1.5--2 mm. long, acuminate at the apex, hispidulous or puberulent like the calyx; corolla hypocrateriform, tiny, purple or magenta-lavender, the tube scarcely surpassing the calyx, the limb inconspicuous, about 1 mm. wide; fruiting-calyx about 2 mm. long, hispidulous, its lobes short, obtuse, mucronate, commonly connivent; cocci trigonous with a convex back, 1.5--2 mm. long, faintly striate, the commissural surfaces meeting at right angles, practically smooth.

The type of this species was collected by Friedrich Heinrich Alexander von Humboldt and Aimé Jacques Alexandre Bonpland (no. 4066) between Pachuca and Cerro Ventoso, Hidalgo, Mexico, and is deposited in the Humboldt Herbarium at the Muséum National d'Histoire Naturelle at Paris.

The species has been collected in llanos, along mountain streams, in moist clay loam, in brown clayish volcanic or dark soil in pine forests, and along grassy roadsides in open pine forests, at altitudes of 7480 to 10,000 feet, flowering in July and August, and fruiting in August. Hinton states that the plant is medicinal. The only common name recorded for it is "verbena". Walpers (1845) classifies it in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Micranthae, and Secondary Subgroup Holophyllae with 22 other species. Schauer (1847) and Jackson (1895) reduce it to synonymy under V. carolina L. It was introduced into cultivation in or about 1819.

It should be noted here that the V. recta of Caesalpini is a species of Lycopus in the Lamiaceae; V. recta Dodon. and V. recta Trag. are V. officinalis L.; V. recta canadensis etc. Moris., V. recta canadensis seu virginiana maxima, urticae foliis Moris., V. recta canadensis s. virginiana maxima urticae foliis Moris., and V. recta canadensis urticae folio Moris. are all synonyms of V. urticifolia L.

Material of V. recta has been misidentified and distributed in herbaria under the names V. carolina L., V. caroliniana L., V. mexicana L., and V. polystachya H.B.K., or (by Salazar) as "V. polystachya var." and (by Nelson) as "Verbena aff. V. polystachya H.B.K." Kenoyer s.n. [Pedrigal, 7-7-38] is a mixture with V. carolina L., while Herb. Hort. Bot. Genev. s.n. [18 Aug. 1826] is a mixture with V. urticifolia var. leiocarpa Perry & Fernald. The O. M. Clark 7348, cited by me in Phytologia 8: 494 (1963) as V. carolina, seems actually to be V. recta.

Perry (1933) cites the following 8 additional specimens and photographs under V. recta not as yet seen by me: MEXICO: Federal District: Pringle 13597 (G). Hidalgo: Humboldt & Bonpland 4066

(E--photo of type). Morelos: G. L. Fisher 320 (E). Oaxaca: Pringle 4769 (D, E, F, G). Puebla: Orcutt 3950 (F). She cites the Pringle 13596 collection (from Cima Station) as being from the state of México; the Pringle 4769 which she cites from "NY" is actually in the Columbia University herbarium. She comments: "Verbena recta, generally determined in the material at hand as 'aff. V. polystachya HBK.", is easily distinguished from this closely related species by the short hispidulous pubescence, the commonly broader leaves, and the compact cylindrical congested spikes. The floral characters of both are similar, although generally the fruiting calyx of V. carolina is more acutely ovoid and the subtending bract is much sharper at the apex."

In all, 82 herbarium specimens and 2 mounted photographs, including phototypes of all the names involved, have been examined by me.

Citations: MEXICO: Federal District: Barkley, Rowell, & Webster 2422 (Au--123243, N); Bourgeau 117 (Cb); Degener & Degener 26257 (N, W); G. L. Fisher s.n. [San Angel, July 18, 1924] (Hp); Kenoyer s.n. [Pedrigal, 7-7-38] (Fs); Matuda 18986 (N); Moldenke & Moldenke 19848 (B, Es, F, Fy, Lg, Lm, Mg, Mr, N, N, No, Ot, Rs, S, Sm, Ss); Peñalosa 795 (Gg); Pringle 13597 (Au--181778, Cp, Gg--421275, Mi, Rf, S, Vt, W--462777, W--1586738); J. N. Weaver 784 (N, W--2134190). Hidalgo: L. I. Davis 229 (N); Humboldt & Bonpland 4066 [Macbride photos 39478] (Kr--photo of type, N--photo of type); Moldenke & Moldenke 19845 (Es, N); F. Salazar s.n. [Real del Monte, July 12, 1913] (W--1013230). México: Berlandier 1222 (W--1169402); Hinton 4607 (N, W--1844761); E. Lyonnet 601 (N, W--1642926); Matuda 21296 (N), 21301 (N), 21575 (N), 28302 (Cb), 28366 (Cb), 28407 (Cb), 28610 (Cb); Rowell 2050 (N); J. D. Taylor 8 (N). Morelos: G. L. Fisher 320 (W--1207409), s.n. [Aug. 5, 1924] (Mi); Matuda 25597 (Z); Rose & Hay 5310 (W--395067); Wyatt 59 (Cb). Oaxaca: E. W. Nelson 1105 (W--250224); Pringle 4769 (Bm, Br, C, Ca--104877, Cm, Gg--152309, Io--38743, Me, Me, Me, Mm--15392, S, Vt, W--254859, W--1418489). Puebla: O. M. Clark 7348 (N). Vera Cruz: Matuda 1277 (Mi). CULTIVATED: Belgium: Herb. Martens s.n. [h. b. lov. 1840] (Br, Br). Italy: Herb. Harvey s.n. [h. R. P. 1819] (Du--166462). Switzerland: Herb. Hort. Bot. Genev. s.n. [18 Aug. 1826] (W--264565). LOCALITY OF COLLECTION UNDETERMINED: Née 80, in part (Q).

VERBENA REGNELLIANA Moldenke, Phytologia 2: 425--426. 1948.

Bibliography: Moldenke, Phytologia 2: 425--426. 1948; Moldenke, Castanea 13: 117. 1948; Moldenke, Alph. List Cit. 3: 846. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94 & 199. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 111 & 473. 1959.

Herb; stems often decumbent and rooting at the nodes; branches

ascending or erect, obtusely tetragonal, brunnescent in drying, often slightly margined, sparsely pilose or glabrescent; principal internodes 1—7.5 cm. long; nodes annulate; leaves abundant, decussate-opposite, often with a cluster of small ones in their axils, brunnescent in drying; petioles slender, 2—5 mm. long, plainly winged, sparsely pilose; leaf-blades thin-chartaceous, darker above than beneath, ovate in outline, 1.5—4.5 cm. long, 0.8—2.6 cm. wide, irregularly incised, the larger trifid, the lobes often with a single exterior divergent tooth, acute or apiculate, very sparsely pustulate-pilose above with extremely short appressed whitish hairs, sparsely appressed-pilosulous (but not pustulate) on the larger venation and on the margins beneath, the margins usually very slightly revolute; venation mostly indiscernible or obscure above, the midrib and very slender secondaries conspicuously prominulous beneath, but the veinlet reticulation indiscernible; inflorescence spicate, long-pedunculate, terminal and also axillary in the uppermost axils, the floriferous portion apparently short and dense or elongating to about 4 cm. after anthesis; peduncles very slender, brunnescent, 3—7.5 cm. long, very sparsely pilosulous; bractlets ovate-lanceolate, about 3 mm. long and 1 mm. wide, sharply attenuate or subacuminate at the apex, subglabrate except for the ciliate margins and sometimes a very few microscopic hairs at the apex; calyx tubular, about 4 mm. long and 1.3 mm. wide, very sparsely and minutely pilosulous, the teeth about 0.5 mm. long; corolla-tube 5—6 mm. long, sparsely and very minutely pilosulous above the calyx; corolla-limb about 4 mm. wide, minutely pilosulous on the outer surface.

The type of this distinctive species was collected by Anders Fredrik Regnell (no. III.939) — in whose honor it is named — on the swampy banks of the rapidly-flowing Rio Verde at Caldas, Minas Gerais, Brazil, on November 20, 1867, and is deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm. It is known thus far only from the type collection. In all, 4 herbarium specimens, including the type, and 4 mounted photographs have been examined by me.

Citations: BRAZIL: Minas Gerais: Regnell III.939 (F—photo of type, N—isotype, N—photo of type, S—type, S—isotype, Si—photo of type, Z—photo of type).

VERBENA REICHEI Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 60—62, fig. 3. 1951.

Bibliography: Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 60—62, fig. 3. 1951; Biol. Abstr. 28: 904. 1954; Moldenke, Phytologia 5: 96. 1954; Moldenke, Résumé 122 & 473. 1959; G. Taylor, Ind. Kew. Suppl. 12: 149. 1959.

Illustrations: Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 62, fig. 3. 1951.

Small subshrub, branched from the base; branches ascending or decumbent, about 25 cm. long, hispid, apparently sparsely foliose on the lower parts (at least when dry); leaves separate, sessile,

1—1.7 cm. long, 6—12 mm. wide, obtuse at the apex, revolute along the margins, attenuate at the base, 3—5-fid, pilose, the middle segment larger, broader, and 3-toothed, the pubescence longer and acclinate above, the venation hispid beneath; inflorescence with 1—3 heads at the tips of the branches; bractlets linear-lanceolate, 3—4.5 mm. long, ciliate along the margins; calyx 7—10 mm. long, slightly dilated at the upper part, hispid, the rim with subulate teeth, the larger ones to 2.5 mm. long; corolla glabrous or lightly pubescent (under a handlens), its tube 1—1.3 cm. long; upper stamens usually with exserted anther-appendages; gynoecium included, about 9 mm. long.

Acevedo de Vargas (1951) says: "Esta planta ha sido confundida en el herbario con V. laciniata (V. erinoides), especie que se reconoce fácilmente por ser más o menos hirsuta, por los segmentos de sus hojas más largos y agudos, por los dientes del cáliz más cortos y por los apéndices de las anteras inclusos en el tubo corolar. También presenta cierta semejanza con Verbena araucana Phil., pero el tipo de esta especie, conservado en el Museo, es distinto." She states that the type of V. reichei is sheet no. 68403 in the Santiago herbarium, but she fails to mention the collector's name [presumably Carl Friedrich Reiche, after whom she named the species], locality of collection, or date of collection.

The species is known to me only from the original description.

VERBENA REITZII Moldenke, Phytologia 3: 119—120. 1949.

Bibliography: Moldenke, Phytologia 3: 119—120 (1949) and 3: 289. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Angely, Fl. Paran. 7: 6. 1957; Reitz, Sellowia 11: 57 & 134. 1959; Moldenke, Résumé 111 & 473. 1959; Reitz, Sellowia 12: 152. 1960; Moldenke, Phytologia 10: 160. 1964.

Shrubby perennial, about 1 m. tall; stems and branches rather stout, acutely tetragonal, glabrate throughout; branchlets more slender, acutely tetragonal, sulcate between the angles, glabrous and shiny throughout; nodes somewhat annulate; principal internodes 1—3.5 cm. long; leaves numerous, decussate-opposite, sessile; leaf-blades chartaceous, firm, rather uniformly bright-green on both surfaces, narrowly elliptic or oblong, 1.4—4 cm. long, 2—6 mm. wide, acute at the apex, amplexicaul at the base, the upper ones entire, the lower ones rather irregularly sharp-serrate with 1—3 teeth per side, glabrous but very slightly scabrid above; midrib very slender, plane or impressed above, prominent beneath; secondaries 1—5, very slender, ascending, obscure or subimpressed above, subprominulous beneath; vein and veinlet reticulation not visible; inflorescence terminal, spicate, the spikes much abbreviated and almost subcapitate, usually in clusters of 3, 1—1.5 cm. long, densely many-flowered; peduncles slender, much abbreviated, 4—14 mm. long, tetragonal, glabrous; bractlets lanceolate, 3—4 mm. long, 1 mm. wide at the base, regularly tapering to the acute apex, glabrous; calyx tubular, 4—5 mm. long, 5-apiculate, glabrous or microscopically strigillose;

corolla red or indigo, infundibular or hypocrateriform, its tube about 4 mm. long, strigillose, the limb 4--5 mm. wide.

The type of this very distinct species was collected by Raulino Reitz (no. 2366) -- in whose honor it is named -- in a wet campo at Campo dos Padres, at an altitude of 1900 meters, Santa Catarina, Brazil, on December 16, 1948, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species has been found on campos and wet campos, at altitudes of 1400 to 1900 meters, flowering in November and December. Common names recorded for it are "camaradinha", "formosa sem dote", and "jurupeba". Reitz 3663 is marked "typus", but is not the type collection -- perhaps it is a topotype. Herbarium material has been misidentified and distributed in herbaria as V. montevidensis Spreng.

In all, 7 herbarium specimens, including the type, have been examined by me.

Citations: BRAZIL: Santa Catarina: Reitz 2366 (N--type), 2344 (N), 3663 (S), 3726 (S); Smith & Klein 7787 (N, Ok, W--2251312).

VERBENA RIBIFOLIA Walp., Repert. 4: 29. 1844.

Bibliography: Walp., Repert. 4: 29. 1844; Schau. in A. DC., Prodr. 11: 539. 1847; C. Gay, Hist. Fis. Chile Bot. 5: 18--19. 1849; F. Phil., Cat. Pl. Vasc. Chil. 221. 1881; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 147. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Briq., Ann. Conserv. & Jard, Bot. Genev. 4: 17. 1900; Reiche, Fl. Chile 5: 285 & 286. 1910; Sanzin, Anal. Soc. Cientif. Argent. Buenos Aires 88: 98, 112, & 134. 1919; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42, 44, & 102. 1942; Moldenke, Alph. List Cit. 1: 40 (1946) and 3: 688. 1949; Moldenke, Phytologia 3: 75 & 76. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 102, 107, & 199. 1949; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 62--63. 1951; Moldenke, Résumé 122, 128, & 473. 1959; Moldenke, Résumé Suppl. 3: 15 (1962), 4: 5 (1962), and 7: 5. 1963.

Diffuse, branched, and hispidulous or very short-pubescent subshrub, the pubescence grayish-yellow, turning reddish in drying; branches numerous, opposite, ascending or horizontal, often flexuous, cylindric except at the apex, reddish, quite lustrous; branchlets subtetragonal, pubescent; leaves decussate-opposite; petioles short; leaf-blades membranous, slightly grayish, oval, 1.2--2.4 cm. long, 4--14 mm. wide, very obtuse at the apex, trifid or 3--many-lobed, long-cuneate or cuneiform and attemuate into the petiole at the base, the middle segment pinnatifid, the lobes subcuneate, 2- or 3-dentate or irregularly crenate-dentate, revolute along the margins, lineate-rugose and rather scabrous or strigose-hirtous above, shortly hispid or hirsute-subvillous beneath, subcanescent, the venation prominent beneath; spikes solitary, terminal and axillary, short-pedunculate, many-flowered, crowded, subcapitate-ovate or subfastigiate during anthesis, later becoming oblong, pubescent, reddish in drying; peduncles short; bractlets linear or linear-subulate, somewhat shorter than or only one-third

as long as the calyx, hirtellous-pubescent; calyx about 6 mm. long, hirtellous-pubescent, the teeth lanceolate, plicate-subulate, deciduous, the posterior one smaller; corolla rose or purple, one-third longer than to twice as long as the calyx, its tube cylindric, glabrous within to the slightly ampliate mouth, puberulous on the outside, the limb small, 5-lobed.

The type of this species was collected by Besser (no. 12) at Concepcion, Chile, and was deposited in the herbarium of the Botanisches Museum at Berlin, now destroyed. Walpers placed the species in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Macranthae, and Secondary Subgroup Aubletia with ten other species, and says of it "Species habitu peculiari distinctissima. -- V. humifusae Cham. quodammodo affinis." Gay (1849) says "Esta especie, cuyas hojas parecen à las de algunos Groselleros, se cria en Concepcion, cerca de Talca, en los cerros de Talcareque, etc." Reiche (1910) says that it is found in the "Cordilleras de Santiago a Concepcion", but he unites V. foetida R. A. Phil. and V. longavina R. A. Phil. with it as synonyms.

The species has been found at altitudes of 1600 to 2500 meters, flowering from December to February. Material has been misidentified and distributed in herbaria as V. marrubioides Cham. Schauer (1847) cites Filtec s.n. and Besser 133 from Concepcion and Gay s.n. from "In editis Andibus Chilensium". Briquet (1900) cites Wilczek 50 from "Talus de chemin de fer transandin à las Cuevas, sur Mendoza, alt. c. 2300 m." He comments that "Espèce signalée à notre connaissance seulement sur le versant chilien des Andes."

In all, 6 herbarium specimens and 3 mounted photographs, including phototypes, have been examined by me.

Citations: CHILE: Concepcion: Besser 12 [Macbride photos 17443] (Kr--photo of type, N--photo of type, N--photo of type). Curicó: Claude-Joseph 5228 (W--1442668). Santiago: Grandjot & Grandjot 4817a (N); P. Philippi 13 (N). Province undetermined: Gillies s. n. [Chili] (T). ARGENTINA: Catamarca: Cabrera 1099 (N). Salta: Venturi 10047 (W--1591427).

VERBENA RIBIFOLIA f. ALBA Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Santiago 25: 63. 1951.

Bibliography: Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Santiago 25: 63. 1951; Biol. Abstr. 28: 904. 1954; Moldenke, Phytologia 5: 96. 1954; Moldenke, Résumé 122 & 473. 1959; Moldenke, Résumé Suppl. 7: 5. 1963.

This form differs from the typical form of the species in having white corollas.

The type of the form was collected by Christian Ludwig Landbeck at Portazuelo in the Cordillera de Colchagua, Chile, at 5000 to 7000 feet altitude, in December, 1860, and is deposited in the herbarium of the Museo de Historia Natural at Santiago as sheet no. 54669. The taxon is known to me only from the original description.

VERBENA RIBIFOLIA var. FOETIDA (R. A. Phil.) Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Santiago 25: 63. 1951.

Synonymy: Verbena foetida R. A. Phil., Linnaea 29: 19--20. 1857.

Bibliography: R. A. Phil., Linnaea 29: 19--20. 1857; F. Phil., Cat. Pl. Vasc. Chil. 220. 1881; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1178. 1895; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42 & 101 (1942) and [ed. 2], 101 & 198. 1949; Moldenke, Alph. List Cit. 3: 696 (1949) and 4: 1298. 1949; Moldenke, Phytologia 3: 290. 1950; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Santiago 25: 63. 1951; Biol. Abstr. 28: 904. 1954; Moldenke, Phytologia 5: 96. 1954; Moldenke, Résumé 122, 364, & 473. 1959; Muñoz Pizarro, Espec. Plant. Descr. Philippi 111. 1960.

Suffruticose; stems decumbent; branches erect, subterete; "petiolus in foliis inferioribus fere 2/5 hujus longitud. occupat"; leaf-blades about 2.6 cm. long and 1.2 cm. wide, cuneate at the base and attenuate into the petiole, tripartite-pinnatifid, laciniate, revolute along the margins, microscopically strigose above, grayish-pubescent beneath, the segments ovate and obtuse; spikes capitate; bractlets linear, slightly shorter than the calyx; calyx about 6 mm. long, its teeth unequal, the upper ones somewhat larger, "dentium calycinis quartam tubi partem superantibus", subobtuse; corolla rose or "yellow to violet" [Milner], its tube incurved, twice as long as the calyx, about 11 mm. long, setose on the inner surface on the back up to the upper anthers with white retrorse hairs, the lobes of the limb about 2.5 mm. long; stamens included; anther-appendages absent.

The type of this variety was collected by Philibert Germain in the Andes of Linares, Chile, in 1856, and is deposited in the herbarium of the Museo Nacional de Historia Natural at Santiago, Chile. The label on Macbride's photograph no. 34353 of an isotype implies that Philippi was the collector, but this seems to be erroneous. Philippi says of this species: "Differt a V. dissecta pubescentia, bracteis multo longioribus, corolla rosea; a V. erinioide corollis obscure roseis, dentibus calycinis triplo longioribus, obtusiusculis, lobis limbi corollae brevioribus."

The plant has been collected at 1800 meters altitude, blooming in December and January. Material has been misidentified and distributed in herbaria as typical V. ribifolia Walp. In all, 3 herbarium specimens and 3 mounted photographs, including phototypes of both names involved, have been examined by me.

Citations: CHILE: Coquimbo: Milner s.n. [Cordillera de San Fernando] (N). Curicó: Barros Valenzuela 8039 (N); Claude-Joseph 5274 (W--1442689). Linares: Germain s.n. [Andes of Linares, 1856; Herb. Mus. Nac. Hist. Nat. Chile 54666; Macbride photos 34353] (Kr--photo of isotype, N--photo of type, N--photo of isotype).

VERBENA RIBIFOLIA var. LONGAVINA (R. A. Phil.) Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Santiago 25: 64. 1951.

Synonymy: Verbena longavina R. A. Phil., Anal. Univ. Chil. 90: 608. 1896. Verbena longovina R. A. Phil. apud Durand & Jacks.,

Ind. Kew. Suppl. 1: 451, sphalm. 1906. Verbena longevina R. A. Phil. ex Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42 & 101, sphalm. 1942.

Bibliography: R. A. Phil., Anal. Univ. Chil. 90: 608. 1896; Durand & Jacks., Ind. Kew. Suppl. 1: 451. 1906; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42 & 101 (1942) and [ed. 2], 101 & 198. 1949; Moldenke, Phytologia 3: 305. 1950; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Santiago 25: 64. 1951; Moldenke, Phytologia 5: 96. 1954; Moldenke, Résumé 122, 369, & 473. 1959; Moldenke, Résumé Suppl. 2: 12. 1960; Muñoz Pizarro, Espec. Plant. Descr. Philippi 111. 1960.

Low, shrubby, about 17 cm. tall; branches about 11 cm. long, hirtous, the principal ones about 4 mm. in diameter, the main one cinereous, the younger ones hirtous; petioles about 5.5 mm. long, hirtous; leaf-blades broadly ovate in outline, about 1.6 cm. long and 1.4 cm. wide, 3-parted, strigillose with appressed hairs, the lobes pinnatifidly divided, the middle one twice as large as the lateral ones, with 13--17 lobules, the lateral ones with 5—7 lobules, the laciniations linear, short, obtuse; spikes capitate; peduncles short, only slightly longer than the leaves; bractlets narrow, subequaling the calyx; calyx about 5 mm. long, whitish-hispidulous; corolla rose-colored, puberulous, its tube twice as long as the calyx; anther-appendages subexserted.

The type of this little-known variety was collected by P. Schoenemann at the Longavi hot springs, Linares, Chile, in January, 1888, and is deposited in the herbarium of the Museo Nacional de Historia Natural at Santiago, Chile. The original publication of Philippi is often cited as "Anal. Univ. Santiago" and dated "1895", but apparently in error. The variety is known only from the original collection, flowering in January. Philippi says of it: "Las hojas son mucho mas chicas que las de las especies afines V. erinoides, sulphurea etc." Only a single phototype has been examined by me.

Citations: CHILE: Linares: Schoenemann s.n. [Longavi, Jan. 1888; Herb. Mus. Nac. Hist. Nat. Chile 54663] (N—photo of type).

VERBENA RIGIDA Spreng., Syst. Veg., cur. Post, 4 (2): 230. 1827.

Synonymy: Verbena venosa Gill. & Hook. in Hook., Bot. Misc. 1: 167. 1829. Verbena scaberrima Cham., Linnaea 7: 267--269. 1832. Verbena rugosa D. Don in Sweet, Brit. Flow. Gard. 7 [ser. 2, 4]: pl. 318. 1836 [not V. rugosa Michx., 1947, nor Mill., 1768, nor Muhl., 1809, nor Willd., 1947]. Verbena scabra Marnock, Floricult. Mag. 5: 87, pl. 54, fig. 3. 1840 [not V. scabra Gray, 1959, nor Mihl., 1825, nor Vahl, 1798]. Verbena rugosa G. Don ex Steud., Nom. Bot., ed. 2, 2: 750, in syn. 1841. Verbena doniana Steud., Nom. Bot., ed. 2, 2: 750. 1841. Verbena rugosa Sweet apud Walp., Repert. 4: 27, in syn. 1845. Buchnera montevidensis Spreng. ex Walp., Repert. 4: 27, in syn. 1845. Verbena rugosa Hook. & Grew. ex Kunth, Ind. Sem. Hort. Berol. 7. 1845. Verbena bonariensis y

rigida (Spreng.) Kuntze, Rev. Gen. Pl. 3 (2): 255. 1898. Verbena bonariensis f. robustior Chod., Bull. Herb. Boiss., sér. 2, 2: 817. 1902. Verbena bonariensis var. venosa (Gill. & Hook.) Chod., Bull. Herb. Boiss., sér. 2, 2: 817. 1902. Verbena bonariensis var. venosa f. robustior Chod., Bull. Herb. Boiss., sér. 2, 2: 817. 1902. Verbena bonariensis var. rigida Kuntze apud Briq., Ann. Conserv. & Jard. Bot. Genèv. 7-8: 291. 1904. ?Verbena venosa var. parviflora Thell. & Zimmerm. ex Hegi, Illustr. Fl. Mitteleur. 5 (3): 2240. 1927. Verbena rigida (L.) Spreng. apud Small, Man. Southeast. Fl. 1138. 1933. Verbena venosa Gill. ex Gonçalves da Cunha & Gonçalves Sobrinho, Revist. Fac. Cienc. 3: 43. 1938. Verbena vemusta Hort. ex Moldenke, Alph. List Invalid Names 51, in syn. 1942. Verbena venosa Hill. & Hook. apud Pittier, Cat. Fl. Venez. 2: 331, sphalm. 1947. Verbena bonariensis var. rigida (Spreng.) Kuntze ex Moldenke, Alph. List Invalid Names Suppl. 1: 22, in syn. 1947. Verbena nervosa Link ex Moldenke, Alph. List Invalid Names Suppl. 1: 25, in syn. 1947 [not V. nervosa Scheele, 1843]. Verbena scabrosa Pyron ex Moldenke, Alph. List Invalid Names Suppl.1: 26, in syn. 1947. Verbena venosa f. umbrosa Osten ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947. Verbena venosa var. rugosa D. Don ex Moldenke, Alph. List Invalid Names Suppl. 1: 28, in syn. 1947. Verbena vinosa G. & H. ex Moldenke, Alph. List Invalid Names Suppl. 1: 28, in syn. 1947. Verbena bonariensis var. rigida f. latifolia Kuntze ex Moldenke, Résumé 359, in syn. 1959. Verbena rigida Hook. & Gil. ex Moldenke, Résumé 373, in syn. 1959. Verbena venosa f. genuina Osten ex Moldenke, Résumé 378, in syn. 1959. Verbina vinosa Gill. & Hook. ex Moldenke, Résumé 379, in syn. 1959. Verbena rigida R. & P. ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963. Verbena venosa Sweet ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963. Verbena venosa H. & G. ex Moldenke, Résumé Suppl. 7: 10, in syn. 1963.

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Illustrations: Curtis, Bot. Mag. 59: pl. 3127 [in color]. 1832; Sweet, Brit. Flow. Gard. 6 [ser. 2, 3]: pl. 207 [in color]. 1833; Journ. Jard. 1835: 56 [in color]. 1835; Sweet, Brit. Flow. Gard. 7 [ser. 2, 4]: pl. 318 [in color]. 1836; Jacq., Annal. Flore & Pomme 1836: pl. 8 [in color]. 1836; Marnock, Floricult. Mag. 5: pl. 54, fig. 3 [in color]. 1840; Rümpler in Vilm., Illustr. Blumeng., ed. 1, 1261. 1873; W. Robinson, Engl. Flow. Gard. pl. 262. 1883; L. H. Bailey, Cycl. Amer. Hort., ed. 1, 6: 1916. 1902; Maiden, Agric. Gaz. N. S. Wales 16 [Misc. Publ. 872]: 706. 1905; F. M. Bailey, Weeds & Poison. Pl. Queensl. fig. 245. 1906; Oesterr. Gart.-Zeit. 5: 57. 1910; Fyson, Fl. Nilgiri & Pulney Hill-tops 2: 213. 1915; N. L. Britton, Fl. Bermuda 311. 1918; Crawford, Addisonia 8: pl. 258 [in color]. 1923; "C.", Gard. Chron., ser. 3, 76: fig. 99. 1924; Hegi, Illustr. Fl. Mittel-Eur. 5 (3): 2240. 1927; Junell, Symb. Bot. Upsal. 4: 19, fig. 17. 1934; Bider, Beitr. Pharmakog. Borag. 97, pl. 7, fig. 1. 1935; Dermen, Cytologia 7: 163, fig. 22, & 169, fig. 39--42. 1936; Augusto, Fl. Rio Grande do Sul fig. 98. 1946; Schnack & Covas, Bol. Soc. Argent. Bot. 1: 282, fig. 1c. 1946; Kuhlmann & Kühn, Fl. Distr. Ibiti fig. 75 [in color]. 1947; W. A. Burpee, Burpee Seeds 1950: 56, fig. 4030 (1950), 1952: 55, fig. 4030 (1952), 1954: 58, fig. 4030 (1954), 1956: 70, fig. 3923 (1956), and 1957: 64, fig. 3923. 1957; Alain in León & Alain, Fl. Cuba 4: 281, fig. 121b. 1957; Lewis & Oliv., Am. Journ. Bot. 48: 640, fig. 23. 1961; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 3, fig. 4. 1962.

Stiff, tufted, rhizomatous or stoloniferous, scabrous-pubescent, perennial herb of erect-spreading habit, usually low, 15 cm. to 1 m. tall, forming wide-spreading clumps, sometimes robust or suffrutescent, with an extensive underground root and rhizome system, the roots fleshy or tuberous, the rhizome creeping or procumbent; stems branched underground, the aerial floriferous ones simple or little branched, usually 2--6.5 dm. tall, herbaceous, ascending or erect, decumbent or creeping at the base, acutely tetragonal, very scabrous-hirsutulous, scabrous-pubescent, or hirtous, abundantly foliose to the middle, about 3 mm. in diameter at the base, the alternate sides sulcate; internodes sometimes greatly elongate; leaves decussate-opposite or approximate, rather dull pale-green, sessile but not connate, remote, rigid or very rigid, oblong to oblong-lanceolate or narrowly obovate, 7.5-10 cm. long, 1--2.5 cm. wide, subcuneate and entire at the base on the lower ones, more or less semi-amplexicaul or subcordate and adnate at the base on the upper ones, acute at the apex, unequally and coarsely subincised-serrate with spreading acuminate teeth, with somewhat revolute margins on older leaves, conspicuously venose, penninerved, scabrous and more or less hispidulous on both surfaces or callose-strigose above and rather shiny beneath and hispidulous only on the veins, lineate-rugose above, rough to the touch; midrib and veins impressed above, prominently reticulate beneath, the primary lateral ones excurrent in the teeth; spikes terminal, in 3's or decussately paniculate, disposed in subternate cymes, short, sessile or the lateral ones pedunculate, fastigiate, usually dense-flowered and congested at first, eventually cylin-

dric and elongating to 5 cm.; bracts usually present at the base of the peduncles, foliaceous, lanceolate or lanceolate-subulate, acute at the apex, entire; peduncles opposite, 3 or 4 pairs forming a sort of decussate panicle, 6--10 cm. long; bractlets lanceolate. acuminate-subulate, usually closely imbricate and longer than the calyx, often 2--3 times as long as the calyx, purple when fresh, hairy or glandular-pubescent, ciliate; flowers very showy and handsome, blooming from below upwards in succession, imbricate, usually crowded in heads or spikes; calyx red or green, cylindric, shorter than the subtending bractlet and hidden by it, 4--6 mm. long, 5-angled, glandular-pubescent or hirtous, its teeth 5, nearly equal, oblique, red, acute, with short mucronulate-subulate tips; corolla rather large, mostly about 10 mm. long, varying from purple, purplish, red-purple, rose-purple, pink-purple, rich brilliant pink-purple, bluish-purple, blue-purple, deep reddish-purple, or magenta to violet, rose-violet, red-violet, bright-violet, blue-violet, dark-violet, lavender-violet, rose, bright-rose, dark-rose, deep rosy-lilac, lilac, brilliant lilac-carmine, red-lilac, purplish-blue, red-blue, intensely violet-blue, or blue, very lightly villosulous or subpilose-pubescent on the outside, inflated toward the middle, its tube slender, 2--4 times as long as the calyx, curved, usually purple, downy-pubescent on the upper part outside and within, mostly surpassing the calyx-teeth by 5--8 mm., the limb 4--7 mm. wide, composed of 5 broad, emarginate, almost bifid, mostly purple segments, the mouth slightly hairy; stamens 4, inserted below the middle of the corolla-tube; filaments short; anthers ovate-lanceolate; pollen-grains oblate-spheroidal, 32—35 μ x 35--39 μ usually 34 μ x 36 μ, the endocolpium lalongate, 2.8 μ x 10.5 μ; pistil about 4 mm. long; style about half as long as the corolla-tube, glabrous; stigma somewhat capitate, with a spur at its base; ovary oval, glabrous; fruiting-calyxes closely imbricate, dilated below the fruit; fruit separating into 4 oblong cocci, on one of which the style sometimes remains, and enveloped by the persistent calyx, which is closed at its mouth; cocci trigonous, slightly broader at the base than at the apex, scarcely 2 mm. long, bright fuscous outside, raised-reticulate on the upper half, striate toward the base with 5 pairs of dorsal nerves, margined, the apex subareolate, the commissural surface white-leathery, muricately scabrous; chromosome number: x = 7, n = 21, 2n = 42.

The type of this poorly described Sprengelian species was collected by Friedrich Sellow somewhere in Rio Grande do Sul, Brazil. It was examined by Otto Kuntze, who states that it is without doubt conspecific with the common plant at that time usually known under the later name of V. venosa, the type of which was collected by John Gillies on the pampas near Buenos Aires, Argentina. Sprengel's type (which may have been the plant photographed by Macbride as his type photograph no. 17444) is now destroyed, having been deposited in the herbarium of the Botanisches Museum at Berlin. The type of Chamisso's V. scaberrima was collected by Sellow somewhere in "Brasiliae meridionali", and was also deposited at Berlin.

A NEW COLOR FORM OF STACHYS FROM LONG ISLAND

Fred W. Oswald

STACHYS HYSSOPIFOLIA f. OSWALDIAE Oswald, f. nov.

Haec forma a forma typica speciei corollis albis recedit.

This form differs from the typical form of the species in having pure white flowers instead of the normally purple- and white-marked pink flowers.

The type of the form was discovered and collected by Eileen Wolde Oswald, in whose honor it is named, in a small tree surrounded, dried-up, and unnamed pond, 500 feet east of Middle Island Road in the area locally known as Locust Valley, Coram, Suffolk County, Long Island, New York, on August 11, 1964, and is deposited in the herbarium of the University of Kansas at Lawrence, Kansas.

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BOOK REVIEWS

Alma L. Moldenke

"Seaside Plants of the World", by Edwin A. Menninger, 303 pp., illustr. Hearthside Press, New York 16, New York. 1964. $9.95

This interesting work lists alphabetically according to plant types, describes, limits ecologically, and photographs (over 400) more than 1500 species in 875 genera of those shoreline plants victorious in varying degrees in the perpetual battle against the salt, sand, and wind associated with the sea.

Authentic text, well written by a highly qualified author, explains the nature of the growth problems in such habitats and the conquest of them, gives directions for planting and soil maintenance, and demonstrates effective conservation means for protecting beach areas and for reclaiming marshlands. The plants are grouped as vines, grass-like forms, other herbs, shrubs, trees generally, and palms specifically. Common and scientific names are given.

In a work of such scope it is difficult to avoid a few errors. On p. 20 "cause" appears in place of "course". The index lists a "Lantana" reference on p. 235, where, however, palms are pictured. The name, "Albizzia", is spelled correctly in the index but incorrectly on pp. 171 and 172. Plate 234 should be labeled Duranta

repens var. variegata. On p. 158 Clerodendrum thomsonae Balf. f. is misspelled and accredited to the wrong author. On p. 213 the name, Vitex altissima, should be accredited to the younger Linnaeus, not the father, and the name, Vitex parviflora A. L. Juss., should have been used instead of "V. altissima Naves ex F. Villar."

There is a good index, a helpful bibliography, and an especially valuable appendix listing the plants according to types and grading them according to their salt and cold tolerances. The photographs are indeed attractive.

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"Dynamic Aspects of Biochemistry", by Ernest Baldwin, 554 pp., illustr., ed. 4. Cambridge University Press, New York 22, New York. 1963. $7.50

Because I had recently studied the excellent previous edition of this book- finding it superior in organization, explanations, diagrams, and examples than most texts on the market - I welcomed the appearance of this fourth edition which is also excellent on all of these scores.

In the short six year span between the printing of these two editions so much biochemical research has been accomplished the world over and such important new basic concepts promulgated, that the text had to be considerably rewritten and augmented. Dr. Baldwin still orients his materials about broad principles that are intelligibly and interestingly explained, illustrated, and exemplified. Newer stresses are on coenzymes, metabolism of 1-carbon, oxidative decarboxylation, citric acid and cognate cycles, nucleic acids, nucleoproteins, and biochemical genetics. Something had to give way for all this new material: the bibliography was lost.

The continuing pace of biochemical work will probably require a fifth edition within a short time. May it be as valuable a treatise as this one!

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"The Picture Book of Perennials", by Arne and Irene Nehrling, 286 pp., illustr. Heathside Press, New York 16, New York. 1964. $5.95

The clearly written plant descriptions, the 250 good drawings, photographs, and color plates, the helpful techniques for growing, the disease-control and landscaping information, the detailed charts for blooming time, and the long time professional experience of the authors make this book both useful and pleasurable. The evaluation of 300 questionnaires returned by

landscape architects, professional gardeners, horticultural writers and teachers, nursery firms, and garden club leaders gives a practical viewpoint especially since the authors asked for the negative features about perennials which are naturally overlooked in most seed and stock catalogues.

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"Biochemistry and Physiology of Plant Immunity", by B. A. Rubin and Ye. V. Artsikhovskaya, translated from the Russian by Helen Wareing, ix + 358 pp., illustr. Pergamon Press, New York 11, New York. 1963. $14.00

This work deals authoritatively with the intricate relationships existing between plants and their pathogens, and the concomitant physio-chemical changes in their protoplasm. It also fixes attention upon the nature of symbiosis, its transformation to and from parasitism, and the possible evolutionary metabolic paths to parasitism. The final and best chapter develops concepts of natural and acquired immunity through the significance of anatomical-morphological characteristics and chemical pathways of the major organic compounds. "Resistance to infection is an expression of all the properties of the organism and of the special features of metabolism as a whole, characteristic to it."

The translation reads easily. A few errors in spelling - such as for "academy" on p. ix, "premature" on p. 279, and "absorption" on p. 348 - should have been caught by a proofreader. The subject index could have been even more serviceable if it had included generic plant names. An excellent set of subject references, especially Russian ones that occasionally are skipped in our abstracting services, increases the value of this work considerably.

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"The Ecology of North America", by Victor E. Shelford, xxii + 610 pp., illustr. University of Illinois Press, Urbana, Illinois. 1963. $10.00

This outstanding work is a printed culmination of the professional life work of the founder of the science of and the first scientific society for ecology. On the basis of careful field studies and on the collation of the early published writings, it describes the biotic communities in North America as they existed around 1500 A. D., before the advent of European settlement (except for the Norse), and so serves as a comparative basis for the study of the subsequent changes in the flora and fauna wrought by our civilization.

The author lists the most characteristic plant and animal species originally inhabiting this continent, along with quantita-

tive data on populations, feeding habits and other plant and animal inter-relationships, climate, soil, topography, and other pertinent environmental factors. The sections on deserts and on mangrove swamps are particularly well done. The scientific names employed are not always the most recently accepted ones. In the Verbenaceae and allied families the following obsolete names were noted: Avicennia nitida for A. germinans, Lippia nodiflora for Phyla nodiflora, Lippia ligustrina for Aloysia gratissima, and Verbena carnea for Stylodon carneus.

This excellent work should certainly achieve the author's goal to present "the structure, composition, and dynamics of the original communities of North America before they finally succumb before the advance of civilization."

- - - - - -

"Principles of Angiosperm Taxonomy", by P. H. Davis and V. H. Heywood, xx + 556 pp., illustr. D. van Nostrand, Princeton, New Jersey. 1963. $15.00

This writing is a very thorough theoretical treatise on the subject by qualified taxonomists of Liverpool and Edinburgh who are familiar not only with classical taxonomy but also with the newer approaches through genetic polyploidy, mathematics, phytochemistry, and machine processing. The emphasis is naturally European. It invites favorable comparison with two recent excellent and somewhat similar American works - "Plant Taxonomy: Methods and Principles", by Lyman Benson, and "Principles of Animal Taxonomy", by George Gaylord Simpson.

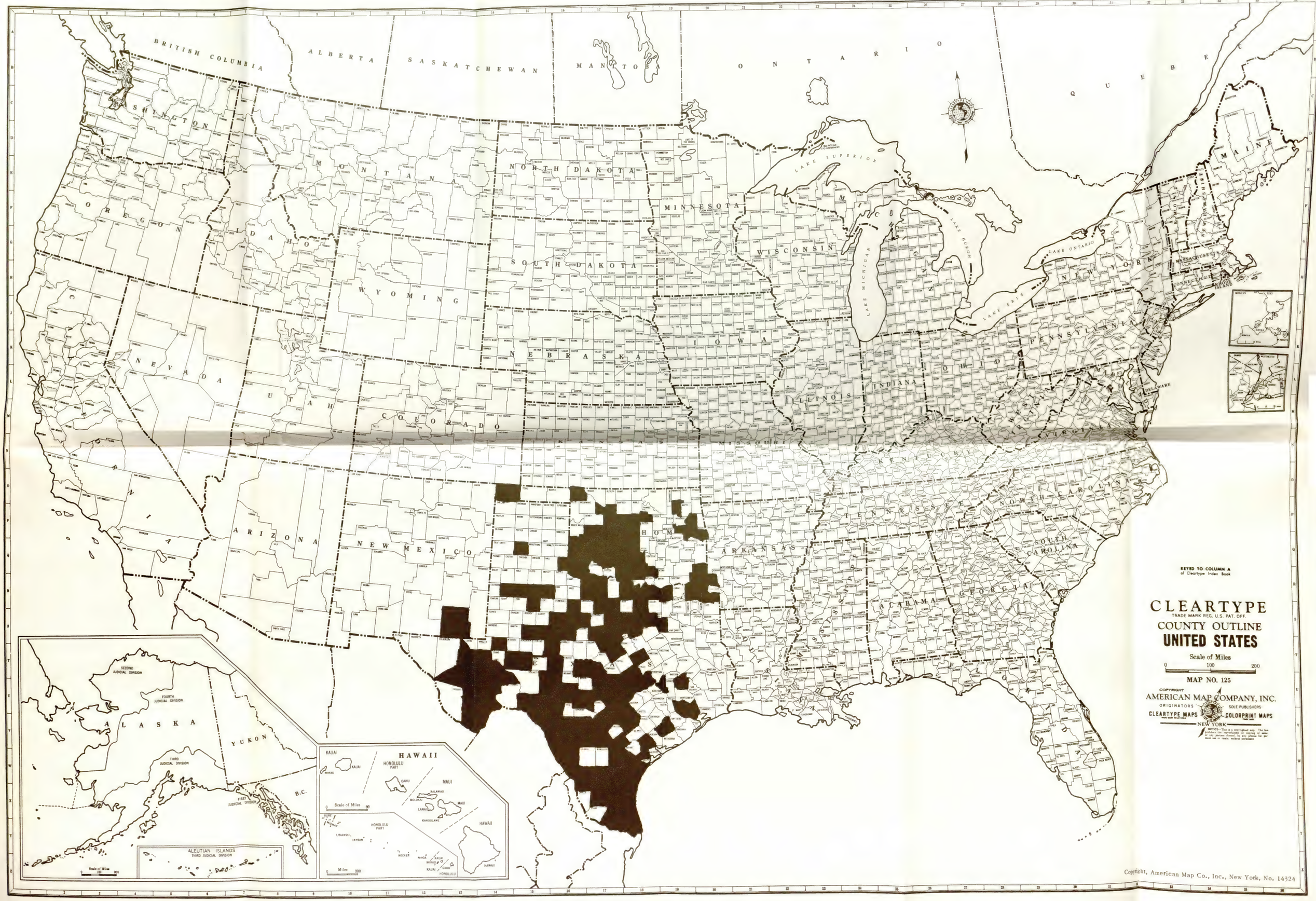
The main topics are: roots of taxonomy, systematics after Darwin, units of classification, concept of characters, all types of taxonomic evidence, field and herbarium and library sources, presentation of data, phenotype modification, variations within populations and environmental influences, evaluation and differentiation of species, hybridization, and lastly an excellent conclusion that recapitulates the major principles and issues.

This book will orient the thinking of many in the field of taxonomy for several years to come, and yet the authors know that its and all taxonomists' "decisions are subject to revision in time. In no case is an ideal or final classification possible, since in even the best worked groups, unstudied (and even unsuspected) attributes may become available at some future date which will cause judgments to be reconsidered and probably modified. Taxonomy is a series of progressive stages of knowledge."

Figure 14. Distribution of Verbena pumila in the United States

Herbarium curators who have [illegible] counties are asked to send it to the author for verification and record, so that future editions of this map may be more complete

Mapping by counties done by Andrew R. Moldenke



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of Cleartype Index Book

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UNITED STATES

Scale of Miles
0 100 200

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MISSOURI BOTANICAL

JAN 11 1965

SPECIES OF ICHNANTHUS IN SOUTH AMERICA RELATED TO I. ICHNODES (GRISEB.) HITCHC. & CHASE

Jason R. Swallen

There have accumulated through the years at the U. S. National Herbarium a number of specimens of Ichnanthus which have seemed to belong to I. ichnodes, and have been so named with reservations that some of them might represent distinct species. These have been reviewed in the past several months, with the result that 10 new species are described below. In every species the fruit has small inconspicuous wings about 1/4 or 1/5 the length of the spikelets. Other characters, such as the size of the plant, the form of the panicle and the size of the spikelets, size of the blades, and the pubescence, make a very diverse group of species. None of them can be identified with I. ichnodes of Trinidad which is a large plant with relatively small spikelets. Some may turn out to be extremes of species when sufficient exploration has been done and enough material is available for examination. The current study will form the basis for any future work.

Sheaths densely pilose with spreading yellowish hairs 5-8 mm. long. Spikelets 2.8-3 mm. long.....1. I. villosissimus
Sheaths glabrous or pilose, but not with long yellowish hairs.
Blades 10-25 cm. long.
Spikelets 4.5 mm. long.....2. I. amplus
Spikelets not more than 3.9 mm. long.
Culms tufted, erect.
Blades, or at least the longer ones, conspicuously narrowed toward the base.
Blades densely velvety-pubescent.
3. I. vestitus
Blades glabrous or nearly so.
4. I. erectus
Blades rounded at the base. Sheaths papillose-pilose.....5. I. vimineus
Culms decumbent-spreading.
Blades with conspicuous white margins, densely velvety.....6. I. indutus
Blades without white margins, not velvety.
Spikelets 2.9-3 mm. long.
First glume nearly as long as the spikelet; blades lanceolate...7. I. lutzelburgii
First glume definitely shorter than the spikelet; blades strongly elliptic-lanceolate.....8. I. pallidus
Spikelets 3.5-3.9 mm. long..9. I. acuminatus
Blades, or at least some of them, more than 25 cm. long.
Plants decumbent or clambering.

Sheaths conspicuously papillose-hirsute; blades 1.5-2 cm. wide.....10. I. hispidus
Sheaths glabrous or nearly so; blades mostly more than 3 cm. wide, at least on the lower part of the plant.
Blades narrowed below into a petiole-like base; sheaths distinctly auriculate.....11. I. auriculatus
Blades not petiolate; sheaths not auriculate.
Panicle large, as broad as long; spikelets 3-3.5 mm. long.....12. I. silvestris
Panicle 2-3 times as long as broad; spikelets 3.5-4 mm. long.....13. I. chaseae

1. ICHNANTHUS VILLOSISSIMUS Swallen, sp. nov.

Culmi basi decumbentes internodiis multis 2-4 cm. longis; vaginae internodiis longiores, papilloso-pilosae pilis luteis 5-8 mm. longis; laminae 15-19 cm. longae, 2.5-3 cm. latae, dense pilosae; paniculae 30-45 cm. longae; spiculae 2.8-3 mm. longae; gluma prima spicula 1/2-1/3 brevior; fructus 2.4 mm. longus alis 0.4 mm. longis.

Perennial; culms decumbent at the base with numerous short internodes 2-4 cm. long, completely covered with overlapping sheaths, these densely papillose-villous with spreading yellowish hairs 5-8 mm. long; blades 15-19 cm. long, 2.5-3 cm. wide, somewhat asymmetrical, softly and densely pilose with hairs about 0.5 mm. long; panicles 30-45 cm. long, with 5 or 6 whorls of ascending branches, the lower ones as much as 20 cm. long; spikelets 2.8-3 mm. long, the first glume acute, 1/2-2/3 as long, scabrous over the back, and sometimes with a few long hairs; second glume and sterile lemma equal, blunt, smooth or somewhat scabrous; fruit 2.4 mm. long, yellowish, the wings small, about 0.4 mm. long.

Type in the U. S. National Herbarium, No. 1255849, collected on steep brushy banks about 2000 ft., La Merced, Peru, August 10-14, 1929, by J. Francis Macbride (No. 5535).

Although sterile, a specimen collected by A. S. Hitchcock (No. 22128), at Colonia Perené, Junín, Peru, undoubtedly belongs to this species.

2. ICHNANTHUS AMPLUS Swallen, sp. nov.

Culmi decumbentes, 1.4 m. longi; vaginae internodiis longiores, glabrae vel marginibus ciliatae; laminae 14-22 cm. longae, 15-17 mm. latae, acuminatae; panicula 40 cm. longa, 25 cm. lata, ramis patentibus 13-15 cm. longis; spiculae 4.5 mm. longae; gluma prima acuta spicula 1/5 brevior; fructus 3 mm. longus alis 0.6 mm. longis.

Perennial; culms spreading, 1.4 m. long, sparsely pubescent at the nodes or glabrous; sheaths longer than the internodes, becoming longer upward, glabrous or with ciliate margins; ligule membranaceous, about 1 mm. long, some lacerate or ciliate; blades 14-22 cm. long, 15-17 mm. wide, attenuate, scabrous on the margins, and with a few long hairs at the base; panicle about 40 cm. long, 25 cm. wide, the branches spreading, the

longest about 13-15 cm. long, mostly naked at the base; spikelets 4.5 mm. long, the first glume acute, 0.5-0.8 mm. shorter, scabrous on the keel; second glume and sterile lemma equal, acute, the glume somewhat scabrous toward the summit; fruit 3 mm. long, pale lead-colored, the wings 0.6 mm. long.

Type in the U. S. National Herbarium, No. 1613273, collected in brushy borders, Campo Salles to Crato, Ceará, Brazil, April 13-15, 1934, by Jason R. Swallen (No. 4332).

3. ICHNANTHUS VESTITUS Swallen, sp. nov.

Culmi caespitosi, erecti ca. 60 cm. alti; vaginae dense pubescentes, villosae vel glabratae; laminae 13-15 cm. longae, 10-17 mm. latae, acuminatae, dense pubescentes; panicula 22 cm. longa, ramis adscendentibus usque ad 13 cm. longis; spiculae 3.2-3.5 mm. longae; gluma prima spicula 1/3 brevior pilis paucis longis praedita; fructus 2.6 mm. longus, alis ca. 0.4 mm. longis.

Perennial; culms tufted, stiffly erect, about 60 cm. tall; sheaths rather closely overlapping, somewhat narrower toward the summit, softly and densely pubescent or villous to glabrate; blades 13-15 cm. long, 10-17 mm. wide, the lower ones on the lateral shoots smaller, acuminate, gradually narrowed toward the base, velvety pubescent; inflorescence 22 cm. long, with widely spreading or ascending branches as much as 13 cm. long, densely pilose in the axils; spikelets 3.2-3.5 mm. long; first glume mostly about 2/3 as long as the spikelet, but ranging from half as long to nearly as long as the spikelet, scabrous on the keel and usually with a few long hairs; second glume and sterile lemma subequal, blunt, with or without a few hairs; fruit 2.6 mm. long, white, the wings small, about 0.4 mm. long.

Type in the U. S. National Herbarium, No. 2182903, collected around dry ledges of Chimantá-tepui, Bolívar, Venezuela, altitude 1700 meters, May 21, 1953, by Julian A. Steyermark (No. 75533).

This species was also collected on Cerro Bolívar by Bassett Maguire (No. 32671).

4. ICHNANTHUS ERECTUS Swallen, sp. nov.

Culmi erecti 70-85 cm. alti glabri; laminae 16-22 cm. longae, 1 cm. latae, acuminatae, pilis paucis base praeditae; paniculae 17-21 cm. longae, 4-7 cm. latae, ramis adscendentibus usque ad 8 cm. longis; spiculae 3.8-4.2 mm. longae, glabrae, appressae; gluma prima spiculam aequans; fructus 3 mm. longus alis 0.8 mm. longis.

Perennial; culms tufted, erect, 70-85 cm. tall, glabrous; sheaths usually slightly longer than the internodes, glabrous, with a line of hairs on the margin and a pubescent collar; ligule about 1 mm. long, membranaceous, ciliate, the hairs about 1 mm. long; blades 16-22 cm. long, 1 cm. wide, subattenuate or acuminate, gradually narrowed to the base, the lower ones smaller, with white scabrous margins and a few long hairs near the base, otherwise glabrous; panicle 17-21 cm. long, 4-7 cm. wide, with ascending branches as much as 8 cm. long;

spikelets 3.8-4.2 mm. long, glabrous, the pedicels appressed; first glume as long as the spikelet or sometimes a little shorter, broad, acute or sometimes short-awned; second glume and sterile lemma equal, acute, similar; fruit 3 mm. long, the wings 0.8 mm. long.

Type in the U. S. National Herbarium, No. 1613193, collected in brushy borders Campo Salles to Crato, Ceará, Brazil, April 13-15, 1934, by Jason R. Swallen (No. 4322).

5. ICHNANTHUS VIMINEUS Swallen, sp. nov.

Culmi erectl 130 cm. alti; vaginae papillosae; laminae 11-15 cm. longae, 1-1.5 cm. latae, papillosae vel papilloso-hispidae; panicula 25 cm. longa ramis adscendentibus usque ad 12 cm. longis; spiculae 2.8-2.9 mm. longae; gluma prima spiculam subaequans; fructus 2.4 mm. longus alis 0.4 mm. longis.

Perennial; culms erect, 130 cm. tall, the nodes appressed-pubescent; sheaths much longer than the internodes, more or less papillose, papillose-ciliate on the margins, the hairs yellowish; blades 11-15 cm. long, 1-1.5 cm. wide, smaller toward the base of the culm, acuminate, very firm, papillose or papillose-hispid, especially on the collar; panicle about 25 cm. long, 10 cm. wide, with rather stiffly ascending branches as much as 12 cm. long; spikelets 2.8-2.9 mm. long, the first glume almost as long, scabrous, especially on the keel; second glume and sterile lemma blunt, equal, scabrous at the tips; fruit 2.4 mm. long, yellowish-brown, the wings small, about 0.4 mm. long.

Type in the U. S. National Herbarium, No. 2238117, collected on "ilhas de mata e campo misturados, beira de estrada até Viana," Porto Velho, Territory of Guaporé, Brazil, May 27, 1952, by G. A. Black & E. Cordeiro (No. 52-14560). Also collected at Porto Velho by E. Cordeiro & J. F. da Silva (No. 247).

6. ICHNANTHUS INDUTUS Swallen, sp. nov.

Culmi graciles basi decumbentes ca. 60 cm. longi, papilloso-pilosi; vaginae internodiis longiores, pilosae, marginibus dense papilloso-pilosae; laminae 8-13 cm. longae, 8-14 mm. latae, dense pubescentes; paniculae 12-15 cm. longae, ramis adscendentibus solitairiis usque ad 6 cm. longis; spiculae 3.5-4 mm. longae; gluma prima spiculam subaequans, 5-nervis, pilis paucis praedita; fructus 2.5 mm. longus alis 0.4 mm. longis.

Perennial; culms slender, hard and woody, decumbent at the base, about 60 cm. long, composed of about 10 internodes, papillose-pilose, especially below the nodes; sheaths mostly longer than the internodes, pilose, densely papillose-pilose along the margins, densely pubescent or villous on the collar; blades lanceolate or more or less ovate-lanceolate, 8-13 cm. long, 8-14 mm. wide, softly and densely pubescent on both surfaces, with rather conspicuous white finely scabrous margins; panicles 12-15 cm. long, with solitary ascending branches as much as 6 cm. long; spikelets 3.5-4 mm. long; first glume nearly as long as the spikelet, 5-nerved, very scabrous on the keel,

sometimes with a few hairs along the margins; second glume and sterile lemma equal, scabrous toward the tip, with a few scattered hairs; fruit 2.5 mm. long with well developed wings 0.4 mm. long.

Type in the U. S. National Herbarium, No. 1255815, collected in brush on clay slope, Campo Santo to the sea, Baía, Baía, Brazil, by Agnes Chase (No. 8046).

7. ICHNANTHUS LUTZELBURGII Mez, Bot. Jahrb. Engler 56: 9. 1921.

The following specimens have been referred to this species: Brazil: Parahyba: Pedras de Fogo, Pickel 1724. Pernambuco: Garanhuns, Chase 7792, 7832. Tapera, Pickel 1363, 2439. Piauí: Vão de Faria, Lutzelburg 5540. Ceará: Campo Grande, Swallen 4585. Maranhão: Barra do Corda to Grajahú, Swallen 3635, 3636. Goias: Goiabeira, Chase 11500-I.

8. ICHNANTHUS PALLIDUS Swallen, sp. nov.

Culmi decumbentes 80-90 cm. longi nodis pubescentibus; vaginae internodiis longiores, pilosae vel hispidae, marginibus papilloso-hispidae pilis 2 mm. longis; laminae 16-25 cm. longae, 15-23 mm. latae, basi pilis longis praeditae; panicula ca. 30 cm. longa, 5 cm. lata, ramis adscendentibus usque ad 14 cm. longis; spiculae 3 mm. longae; gluma prima spicula 1/6-1/5 brevior; fructus 2.3-2.4 mm. longus alis 0.5 mm. longis.

Perennial; culms decumbent, 80-90 cm. long, the lower 15 cm. covered with much overlapping sheaths, the nodes pubescent; sheaths all longer than the internodes, variously pilose or hispid, with a prominent line of papillose hairs on the margins about 2 mm. long; blades 16-25 cm. long, 15-23 mm. wide, acuminate, gradually narrowed toward the base to the width of the sheath, sometimes sparsely papillose-hispid on the upper surface, with a fringe of long, papillose hairs near the base; panicle about 30 cm. long, 5 cm. wide, with narrowly ascending branches as much as 14 cm. long; spikelets 3 mm. long; first glume 3-nerved, 4/5-5/6 as long as the spikelet, scabrous on the keel; second glume and sterile lemma equal, blunt, scabrous toward the tip; fruit 2.3-2.4 mm. long with wings 0.5 mm. long.

Type in the U. S. National Herbarium, No. 1763244, collected in patch of forest in scrub savanna, at Yupukari, basin of Rupununi River, British Guiana, October 15, 1937, by A. C. Smith (No. 2263).

9. ICHNANTHUS ACUMINATUS Swallen, Fieldiana 28: 28. 1951.

The following specimens are referable to this species, although they vary somewhat from the type. The main difference is in the size of the leaves, which may be as little as 10 cm. long and 1 cm. wide, or as much as 35 cm. long and 3.5 cm. wide.

Colombia: Santander: Mesa da los Santos, Killip & Smith 12218.

Venezuela: Bolívar: 105 km. from El Dorado to St. Elena, Foldats 2779; Gran Sabana between Mission of Santa Teresita de Kavanayén to Río Karuai, Steyermark 59371; between Santa Teresita de Kavanayén and base of Ptari-tepui, Steyermark 60335;

between Kun and Uaduarapara in Valley of Río Kukenán, Steyermark 59086 (type); al pié del oro Ceitá, Gran Sabana, Tamayo 2929. Sucre: En sitios de Las Altas, Tamayo 2131. Carabobo: Bejuma road, Box 3886, 3887. Aragua: Mountains north of Maracay, Box 3947.

British Guiana: Kaieteur Savanna, Jenman 902; Sandwith 1289. Orinduik Falls, Ireng River, Harrison 1461; Imbaimadai, Maguire & Fanshawe 32264.

Brazil: Ceará: Campo Grande, Swallen 4523. Pará: Pires & Silva 4259.

10. ICHNANTHUS HISPIDUS Swallen, sp. nov.

Culmi radicantes 1 m. longi nodis villosis; vaginae internodiis multo longiores dense papilloso-hirsutae; laminae 20-30 cm. longae, 1.5-2 cm. latae, acuminatae, papilloso-hispidae; panicula 25 cm. longa ramis usque ad 12 cm. longis; spiculae 3.8 mm. longae; gluma prima spicula 1/5 brevior; fructus 2.8 mm. longus alis 0.4-0.5 mm. longis.

Perennial?; culms straggling, 1 m. or more long, white-villous at the nodes and for a short distance below; sheaths all much longer than the internodes, rather densely papillose-hirsute with spreading hairs about 5 mm. long; blades about 20-30 cm. long, 1.5-2 cm. wide, acuminate, papillose-hispid on both surfaces, especially toward the base; panicle 25 cm. long, with ascending branches arranged in 5 or more whorls, as much as 10-12 cm. long; spikelets 3.8 mm. long, the first glume 4/5 as long to nearly as long as the spikelet, scabrous on the keel and nerves, occasionally with a few long hairs; second glume and sterile lemma equal, blunt, more or less scabrous at the tip; fruit 2.8 mm. long, the wings small, 0.4-0.5 mm. long.

Type in the U. S. National Herbarium, Nos. 2182142 and 2182143, collected on Cerro Altamira, 10 km. east of Ciudad Piar, 425-650 m. altitude, State of Bolívar, Venezuela, October 19, 1953, by Bassett Maguire, John J. Wurdack & George S. Bunting (No. 35877). Also collected on river banks of Río Tirica, Caroní, Guayana, Venezuela, by F. Cardona (No. 2231).

11. ICHNANTHUS AURICULATUS Swallen, sp. nov.

Culmi erecti 2.3 m. alti, pilosi, nodis pubescentibus; vaginae internodiis breviores, glabrae, auriculatae; laminae 28-37 cm. longae, 3.5-5 cm. latae, acuminatae, prope basin petiolatae, infra et supra pilosae; panicula 55 cm. longa ramis adscendentibus vel patentibus usque ad 20 cm. longis; spiculae 3.6-3.8 (4.0) mm. longae; gluma prima spicula 1/3 brevior; fructus 2.6 mm. longus alis 0.5 mm. longis.

Perennial; culms erect, 2.3 m. tall, more or less pilose with pubescent nodes; sheaths shorter than the internodes, glabrous, with prominent auricles up to 8 mm. long, and densely villous collar; blades 28-37 cm. long, 3.5-5 cm. wide, acuminate, gradually narrowed to a petiole-like base, pilose on both surfaces, the petiole densely hispid with hairs about 4 mm. long, the margins finely scabrous; panicle 55 cm. long, with narrowly ascending to spreading branches as much as 20 cm. long, pubes-

cent to pilose at the base, and with a few long hairs intermixed; spikelets 3.6-3.8 mm. long, rarely to 4 mm.; first glume 2/3 as long as the spikelet, scabrous on the keel near the summit, otherwise glabrous; second glume and sterile lemma equal, acute, glabrous; fruit 2.6 mm. long, the wings 0.5 mm. long.

Type in the U. S. National Herbarium, No. 1448867, collected among brush, wooded slope, between Itabira and Goiabeira, from Annapolis and Goias, Goias, Brazil, altitude 1000 m., March 22, 1930, by Agnes Chase (No. 11488).

Additional material examined: Brazil: Goias: Vicinity of Goiabeira, Chase 11500-II, 11504. Minas Gerais: Between Uberlandia and Rio Paranahyba, Chase 12107.

12. ICHNANTHUS SILVESTRIS Swallen, sp. nov.

Culmi basi decumbentes, 180 cm. longi, glabri; laminae 28-32 cm. longae, 18-33 mm. latae, glabrae; panicula 32 cm. longa ramis usque ad 18 cm. longis; spiculae 3.3-3.5 mm. longae; gluma prima spicula 1/3 brevior, pilis paucis praedita; fructus 2.6-2.8 mm. longus alis 0.5 mm. longis.

Perennial; culms rather coarse, decumbent at the base, 180 cm. long, glabrous; blades mostly 28-32 cm. long, 18-33 mm. wide, glabrous, the margins scabrous; sheaths a little longer than the internodes, glabrous on the back, the margins pilose-ciliate, the collar shortly pubescent; panicles 32 cm. long, nearly as wide, pyramidal, the branches in 4 or more fascicles as much as 18 cm. long, pilose in the axils; spikelets 3.3-3.5 mm. long; first glume triangular, about 2/3 as long as the spikelet, with a few scattered hairs along the scabrous keel and on the margins; second glume and sterile lemma subequal, blunt, glabrous or usually with a few scattered hairs on the keel and margins; fruit 2.6-2.8 mm. long, obscurely yellowish, the wings 0.5 mm. long.

Type in the U. S. National Herbarium, Nos. 1614126 and 1614125, collected in sandy forest, Japanese concession, 35 km. north of Monte Alegre, Pará, Brazil, January 28, 1934, by Jason R. Swallen (No. 3418).

Although there is some difference in the length of the panicle and in the general aspect, the following specimens seem to belong to this species: Brazil: Pará: Aramanahy, Rio Tapajos, Swallen 3225; Obidos, Swallen 5079; João Coelho-Vigia, Black 52-14175; Rio Arapiuns, Pires & Silva 4240. Territory of Amapá: Macapá, Black & Froes 51-12284; Rio Araguari, down river from Porto Platón, Pires, Rodriguez & Irvine 51006.

13. ICHNANTHUS CHASEAE Swallen, Contr. U. S. Nat. Herb. 29: 271. 1949.

This species is very closely allied to I. acuminatus Swallen. The first glume is longer, the spikelets are larger (3.5-4 mm.), and do not have the long hairs that they do in I. acuminatus. These characters which seem to be enough to separate the two species now, may turn out to be only variables

of the same species when more material is available or studies are made in the field.

Venezuela: Carabobo: South side of Lake Valencia, Chase 12340. Aragua: Parque Nacional, Chase 12463.

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MATERIALS TOWARD A MONOGRAPH OF THE GENUS VERBENA. XXIV

Harold N. Moldenke

VERBENA RIGIDA Spreng.

Verbena venosa f. umbrosa is based on a collection made by Cornelius Osten (no. 11637) in shady places on rocky hills at Solis, in the Sierra Animas, department of Maldonado, Uruguay, between November 20 and 24, 1917, and is deposited in the herbarium of the Museo de Historia Natural at Montevideo. It has greatly elongated internodes and is apparently a shade form. Verbena venosa f. genuina is based on Osten 11636 from hedges at the same locality, collected at the same time, and deposited in the same herbarium. Verbena venusta is based on a collection made by C. J. Meyer in July, 1897, at Munich, Germany, deposited in the herbarium of the University of Michigan; V. nervosa Link is based on Herb. Hort. Matrit. 33, collected from cultivated material in Spain and deposited in the herbarium of the Jardin Botanico at Madrid; and V. scabrosa is based on a collection made by Joseph Hicks Pyron at the old reservoir in Clarke County, Georgia, on July 4, and is deposited in the herbarium of Duke University. I know nothing of V. venosa var. parviflora except what is said of it by Hegi (1927): "auf Schutt beim Friedhof von Mannheim [1913]."

The species is apparently native from central Brazil south to northern Argentina, but has been introduced and become naturalized in Chile, the West Indies, Mexico, Costa Rica, the southern United States, the Azores, Madeira, the Canary Islands, England, Sweden, South Africa, India, the Pacific islands, and Australia, blooming practically throughout the year. It is widely cultivated in many parts of North and South America, the West Indies, Europe, Java, and Hawaii, introduced into cultivation in 1830. Laplace says "introduit en 1839 [in France], originaire de La Plata". Mattoon (1958) states that it is offered to the horticultural trade by Georges Delbard, Watkins & Simpson (London), Hillier & Sons (Winchester), La Germinadora, Unwin, Vaughan's (New York and Chicago), Sutton & Sons (Reading), Thompson & Morgan, Hurst & Son (London), John Forbes (Hawick), and Pearce (Moorestown, New Jersey).

It is a very showy plant, especially when forming large patches of brilliant purple, as I personally observed it in Brazil and in the southern United States. The typical form has

purple flowers — plants with a paler lilac blossom have been called var. lilacina, which see. It is not certain how many of the color variants listed above in the specific description as reported by collectors really represent different color forms and how many are merely the result of different terminology or a faulty color-sense on the part of the observers. Whether there is really a blue form or whether these reports are from collectors colorblind to red is not as yet known to me. For the record, the following are some of the collections whose labels give definite colors for the flowers: "purple" — Barclay & Purdue 744, Hassler 216a, Jörgensen 2464, Lundell & Lundell 11206, Mexia 5387a, Meyer 289, Questel 3855, Rojas 3407, Sidey 1966; "purplish" — Walther 197; "brilliant purple" — E. C. Smith s.n.; "vivid purple" — Clemens s.n.; "rich brilliant pink-purple" — Cronquist 4144; "red-purple" — Lundell & Lundell 10502; "rose-purple" — Burdick s.n.; "deep reddish-purple" — Correll & Rollins 21061; "violet-purple (no. 733 Royal Horticultural Society Colour Chart 1938—42) — Bracelin 1306; "blue-purple" — Rodriguez 545; "violet" — Berro 2362, 5535, & 7856, Burkart 14067, Dormon s.n., Grüner 90, Harris 11969, Hatschbach 1617, Ibarrola 3393, Legrand 4189, Rodriguez 545, Rojas 13118, Schwarz 1319; "dark-violet" — Anglade 625, Osten 3864; "bright-violet" — Osten 11636; "lavender-violet" — Duncan 10646; "rose" — Sampaio 1920, Schwarz 1249; "bright-rose" — Jörgensen 2637; "dark-rose" — Jörgensen 2464; "lilac-rose" — Herb. Inst. Bot. São Paulo 870; "magenta" — Erlanson 5613; "light-lavender" — McLeod s.n.; "lilac" — Bertoni 1156, Montes 2152; "violet-blue" — Herb. Osten 17051; "red-blue" — Pickel 5165; "blue" — Herb. Inst. Bot. S. Paulo 41852, Ibarrola 3503 & 3869, Montes 1058, Pickel 5491, Ruiz Huidobro 4607 & 5083, Schwarz 2081, Venturi 2731; "dark-blue" — Venturi 2731 & 9953.

The species has numerous common names, as is to be expected for a plant so widely cultivated and introduced, among which are "camaradinha", "camaradinhas", "Felsheide", "formosa sem dote", "hardy garden verbena", "hardy garden vervain", "hardy verbena", "hardy verbena venosa", "jurupeba", "large-veined verbena", "margarita", "margarita morada", "purple vervain", "runzelblättriges Eisenkraut", "stiff verbena", "strong-leaved vervain", "strong-veined vervain", "tall verbena", "tuber verbena", "tuber vervain", "veiny vervain", "verbena", "verbena Mammoth Mixed", "vervain", and "verveine à feuilles rugueuses". The name recommended by STANDARDIZED PLANT NAMES is "tuber verbena".

Philippi (1896) says "Es propiamente planta del Brasil meridional i de la República Arjentina, i el ejemplar recojido ha nacido cerca de Santiago quizas de una semilla traida por alguna casualidad. No conviene en todos puntos con la descripcion de Schauer. Su tallo tiene 80 centímetros de altura i un poco mas de 3 milímetros de grueso en la base. Las hojas son en nuestro

ejemplar bastante apartadas i no 'aproximadas', las mayores, que se hallan en el medio del tallo, miden 10 centímetros de largo i 2 1/2 centímetros de ancho, i hai unos 7 dientes de cada lado. El pedúnculo central tiene (incluso la espiga) 6 centímetros de largo, los laterales 10 centímetros. La lonjitud de las bracteas es de 2 1/2 milímetros, la del cáliz 5 a 6 milímetros, miántras segun Schauer las brácteas han de ser mas largas que el cáliz; la corola mide 10 milímetros. (En la obra de Gay se ha olvidado de mencionar la)." Reiche (1910) says "A esta especie brasileña i arjentina se refiere una sola muestra (escapada de un jardin?) que se encontró cerca de Santiago."

Walpers (1845) classifies the species in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Macranthae, and Secondary Subgroup Melindres, with 10 other species. It has been collected in both moist and dry soil, sandy waste ground, sandy or calcareous soil, weedy rich open soil, formerly cultivated soil, open dry sandy soil, and black earth, at altitudes of 3 to 2300 meters. Collectors have found it in fields and grassy places, campos and dry grassy campos, wet and shrubby campos, open fields and wet pastures, dry sandy pastures and varzea land, open places along the edge of railroads, grassy hollows and roadside banks, wet places and meadows, low woods and secondary forests, moist fields and pastures, sandy vacant lots and waste places, hedges and thickets, high campos, swamps, and grassveld, alpine meadows and damp thickets, grassy prairie-like openings, open localities, and mixed pine-oak woodlands, rocky mountains and declevities in rocky hills, shady places on rocky hills, at the edge of highways and woods, along roadsides, weedy roadsides, ditches, chalky or sandy roadsides, riversides, and railroad rights-of-way, under Eucalyptus trees, and on bare hills, grazed hilltops, Indian shellmounds, low or dry ridges, rocky plateaus, roadside banks and road embankments, dry sandy or rocky road shoulders, and coastal prairies. Often it is found in the neighborhood of human dwellings. In Misiones it has been encountered in colonies in full sunshine on the sites of recent forest fires. In Brazil it has been collected at 950 meters altitude, in Cuba at 1000 m., in Argentina from 55 to 1200 m., in India at 2000 m., and in Bolivia at 2300 m. It has been found blooming in every month of the year, and in fruit from April to December.

In Texas the species occurs in pastures and prairies and along roadsides, adventive from cultivation and very showy in large patches, in the Timber Belt, Coastal Prairies, and Blackland Prairies in the central and eastern parts of the state, from Shelby to Travis and Brazoria Counties. E. C. Smith says "forming large spreading patches of brilliant purple" in Galveston County; Tharp, Turner, & Johnston found it "in gumbo glades (a local prairie on tight marly substratum completely surrounded by pinewoods on sandy soil)" in Tyler County. Barclay & Purdue say "abundant along fences and roadsides" in Harris County, while Cory maintains "likely introduced by State Highway Dept." in Waller County. Hall found it "adventive from cultivation on prairies

at Houston" in 1872, but Bebb in 1903 says "very showy in large patches -- this must be rare -- no specimens at F. C. M. and only noted at Houston by Small." Shinners (1958) states "rarely cultivated; found once as an escape on vacant lot in Dallas (more frequent in southeastern Texas). May--June." Coker calls it "an old garden favorite in the South". Langlois found it on the "borders of the Mississippi" and "rare on roadsides" in 1885 in Plaquemines Parish, Louisiana. Between 1878 and 1880 Mohr reported it as "extensively naturalized", "perfectly established", and "around dwellings, introduced, perfectly naturalized" in Mobile County, Alabama. Ahles found it "forming colonies on roadsides" in South Carolina.

Kuhlmann & Kühn (1947) call V. rigida a nomophyte; Rambo found it in a region of 2 meters annual rainfall, rare snows, and a temperature of 0--25° C.; I found it abundant in dry sandy Eucalyptus woods in Rio Grande do Sul, Brazil. Thorne (1954) reports it from "roadsides and waste places, frequent"; Jürgensen found it "common on campo" at Villarica, Paraguay. Bartlett describes it from McDuffie County, Georgia, as growing on "subsoil a sandy red loam formed in situ through decomposition of the Piedmont gneisses, overlain by white sand of the Columbia formation." In Argentina Parodi found it "growing in the Andropogon lateralis zone on the climax steppe in dept. San Martín, Corrientes, along with Nothoscordum, Zephyranthes, Polygala, Cuphea, Aristolochia, Aspilia, etc." Reitz describes it as "ruderal" in Santa Catarina. Sidey refers to it as a "creeper" in the Transvaal; Anglade says "wild everywhere" in Madras; Clemens says "a vivid purple weed" and L. S. Smith says "common roadside weed, occasionaly troublesome in cultivation" in Queensland, while Rosengurtt reports it as "gregarious but rare" in Uruguay.

Domin (1928) states that "In Argentinien einheimisch; in Süd-Queensland und N. S. Wales an einzelnen Stellen völlig eingebürgert, so auch in der Mulde zwischen den Tambourine und Beech Mts." In Bermuda it is described as "frequent in meadows" by Taylor and "abundant in spots as if an escape" by Collins. Neal (1948) calls it a "weed at 3000 feet" in Hawaii. Parodi (1943) says "habita en la estepa" in Corrientes and notes that he observed it planted with beautiful effect in Hyde Park, London. Troncoso (1937) reports it as cultivated in Buenos Aires. Gonçalves da Cunha & Gonçalves Sobrinho cite it from Santa Maria in the Azores. It is recorded from Bristol, England, in Proc. Bristol Naturalists Soc. 1937: 261, and is called an adventive in England by Douglas H. Kent in a letter to me dated November 28, 1949.

For those interested in plotting the spread of this species into regions other than its native ones, I submit herewith the earliest dates discovered so far by me for the species occurring in a wild state in certain areas: North Carolina -- Martin County in 1922, Northampton & Washington Counties in 1935; South Carolina -- Allendale in 1958, Barnwell County in 1962; Georgia -- Bibb County in 1888, McDuffie County in 1907, Clarke County in 1925,

Dooly County in 1928, Jackson County in 1931, Pike County in 1936, Crisp County in 1937, Greene County in 1939, Calhoun County in 1947, Clinch County in 1959, Bacon, Bleckley, Burke, Dodge, Grady, Hancock, Jeff Davis, Jefferson, Monroe, Putnam, Screven, Telfair, Twiggs, & Washington Counties in 1962; Florida -- Walton County in 1938; Alabama -- Mobile County in 1868, Sumter County in 1934; Mississippi -- Lincoln County in 1882, Claiborne County in 1925, Warren County in 1927, Forrest County in 1931, Jefferson County in 1946, Rankin County in 1950, Clarke & Pike Counties in 1955, Adams County in 1963; Louisiana -- East Baton Rouge Parish in 1874, Plaquemines Parish in 1879, Saint Tammany Parish in 1901, West Feliciana Parish in 1912, East Feliciana Parish in 1931, Saint Mary Parish in 1935, Ascension & Washington Parishes in 1937, Orleans Parish in 1958; Texas -- Harris County in 1872, Galveston County in 1895, Orange County in 1914, Walker County in 1917, Travis County in 1935, Brazoria County in 1938, Fort Bend County in 1939, Cherokee & Shelby Counties in 1941, Jefferson County in 1942, Lee & Waller Counties in 1948, Montgomery County in 1960; Bermuda -- 1905; Cuba -- 1913; Jamaica -- 1908; Guadaloupe -- 1893; Martinique -- 1901; Mexico -- 1913; Madeira -- 1865; Azores -- 1937; Sweden -- 1930; Switzerland -- 1912; New South Wales -- 1927; Victoria -- 1928; Queensland -- 1928. Undoubtedly there are earlier records, but these are the earliest noted thus far by me.

It is worth noting here that Jörgensen 2637 shows leaves rather broad and hairy. Model 298 in the Glass Flowers exhibit at Harvard University shows longitudinal and transverse sections of the ovary, stamens, pistil, and opened corolla of this species. In 1949 a specimen of V. rigida was sent to Dr. R. P. Wodehouse by a physician who stated that he had a patient with an allergy like that of poison-ivy (Toxicodendron radicans) caused by this species. Patermann (1935) reports "Zwergpollen kamen nicht zur Beobachtung" in this species.

It should also be noted here that the V. nervosa of Scheele is actually Buchnera elongata Sw. in the Scrophulariaceae, V. rugosa Michx. is a synonym of V. stricta Vent., V. rugosa Mill. is a doubtfully valid species (which see), V. rugosa Muhl. and V. rugosa Willd. are V. simplex Lehm., V. scabra Vahl is a valid species (which see) of which V. scabra Gray is a synonym, and V. scabra Muhl. is Phyla lanceolata (Michx.) Greene. In Meded. Rijks Herb. Leiden 29: 43 (1916) our plant is misidentified as V. hispida Ruíz & Pav. by Herzog. Morphological notes on V. rigida are given in Svensk Bot. Tidsk. 32: 231 (1938) and by Junell (1934). Hooker (1829) states that the fruit of this species is very like that of V. intermedia Gill. & Hook. In his 1832 work he says that V. rigida is allied to V. bonariensis L., differing in its much shorter spikes and vastly larger purple flowers. He might have added that the texture of the leaves usually is very different. Briquet in Arkiv Bot. 2 (10): 10--11 (1904) reduces his V. bonariensis var. reineckii to what we now

call V. rigida, but I am not at all sure that this variety is really invalid. In Ann. Conserv. & Jard. Bot. Genèv. 7-8: 291—292 (1904) he reduces V. rigida to varietal rank under V. bonariensis, following Kuntze. He states that it is characterized by its large corollas whose tube surpasses the calyx-teeth by 5—8 mm. and whose limb measures 4—7 mm. in diameter. He claims that it represents a transition between typical V. bonariensis and his so-called var. brevibracteata and var. longibracteata, which I regard as V. intermedia Gill. & Hook.

Rümpler (1873) says of V. rigida: "Brasilien. - Einjährig, im Gewächshause ausdauernd. - Stengel vierkantig, steifhaarig, 25—40 Centimeter hoch. Blätter gegenständig, fast stengelumfassend, länglich, keilförmig, ganzrandig, gekerbt-gezähnt, runzelig, oben glatt, unten steifhaarig. Blüthen bläulich-violett, in Anfangs doldenformigen, dann verlängerten, gewöhnlich zu drei bein einander stehenden Aehren, von denen die seitlichen gestielt und kleiner. Dieses Eisenkraut kann bei der Ausstattung der Blumenbeete Verwendung finden; es blüht von Juni bis Oktober. Kultur und Verwendung wie bei Nr. 1 [V. canadensis]. Obschon diese Art länger als ein Jahr sich halten kann wenn man sie in das Gewächshaus nimmt oder aus Stecklingen erzieht, so pflegt man sie doch als Einjährige zu behandeln. Wenn man sie aber in einem gesunden Boden kultiviert, mit Glasfenstern deckt und während strengen Frostes schützt, so treibt sie im Frühjahre mit noch grösszere Kraft, als im ersten Jahre und die Blüthe ist dann früher und reicher." In Gardening 1: 563 (1879) "J. H." writes that "This is a most useful plant, as it grows and flowers abundantly in almost any kind of soil or situation. It looks all the brighter for drenching rains, and lasts very late in the season. When all the ordinary varieties of Verbena fail, this one is sure to give satisfaction. It is easily kept through the winter, and if its fleshy roots are stored thickly in boxes any number of plants may be propagated in spring from the young shoots that are abundantly thrown out. It should be planted rather thickly, and pegged down until the ground is covered, when it will continue to flower until the last of the summer flowers are removed or destroyed by the frost." Potz (1964) states that 20 days are required for seed germination.

Haage & Schmidt (1898) say: "reizend, für Rabatten und Einfassungen; tres prope pour massifs ou bordures." Farrington (1934) comments that "Verbena venosa is being mentioned by growers looking for plants which have proved their value. It has been listed in the catalogues for a long time and has been grown with success by park superintendents and the gardeners on private estates, but amateurs in this section [New York] seem to have overlooked it. This verbena is distinctly different from all other kinds and produces great quantities of bright purple flowers all summer. It would be difficult to find a better subject for bedding purposes. Some garden makers have been disappointed in this verbena because they have looked upon it as a hardy perennial, certain catalogues

having listed it among the hardy plants. It is a perennial, as are most of the verbenas in warm countries, and very likely will go through the winter safely outdoors in the latitude of Philadelphia. Indeed, it has been wintered without loss on Long Island, and yet it must be considered as a tender plant and started from seeds each spring, the seeds being sown early."

Henderson (1950) lists it as among the most popular hardy perennial plants. He calls the flowers purplish-blue, "1 1/2 feet tall, blooms summers, sunny locations, any soil, useful for borders or beds." On his seed packet 4486 he says "Sow in shallow boxes of light soil in the greenhouse, hot-bed or light window in a temperature of from 60 to 70 deg., covering the seeds to a depth of only four times their size, press down with a board firmly, water with a fine spray, and do not allow the seedlings to dry out. Transplant 1 inch apart into similar boxes or 2 inch pots as they require, if plants in pots are desired, when the seedlings have formed 2 or 3 leaves, and plant out in the garden after danger from frost. They can also be sown in the open ground, after danger is over from frost." Horticulturists in general describe the plant as spreading, "1 ft. tall, covered with large panicles of purplish blue flowers from July until frost. Blooms the first year if started early. Largely used for bedding and makes a good groundcover." It is Haage & Schmidt's seed no. 5923, and Park's no. 2064. Park sells the seed at the rate of 25 cents per packet of 100, 45 cents for 200, 1/8 ounce for $1.25, 1/4 ounce for $2.25. Jones says "Hardy border plant, plant a few feet apart; spreads 2—3 ft., 2 ft. tall." Chittenden calls it "a good bedding plant, the tubers of which may be kept like dahlias over winter." Bailey (1935) reports that it is offered to the trade by Andorra Nurseries (Philadelphia), Borsch, Breck, Brooklyn Botanic Garden, Buist, Burnett, Burpee, Carters (London), Cheltenham, Chester Jay Hunt, Cronamere, Dreer, Ferndale Nursery (Askov, Minnesota), Floraire, Gardenside, Great Valley Mill Garden (Paoli, Pennsylvania), Haage & Schmidt, Henderson, Hocker, Hunt, Huntington, John Waterer Sons (Twyford, Berks.), Kaye, Lexington, McConnell Nursery Co. (Port Burwell, Ontario), McDonald, Michell, Mulley-Seely, Schling, Siebenthaler, Stumpp & Walter, Sutton, Thompson-Morgan, Trivetts, Vilmorin, Waterer, and Wayside. In Journ. Roy. Hort. Soc. Lond. 61: 401 (1935) it is reported that seeds were secured from Bodger Seeds (El Monte, California).

Material of V. rigida has been misidentified and distributed in herbaria under the names V. angustifolia Michx., V. aubletia Jacq., V. bonariensis L., V. bracteata Lag. & Rodr., V. brasiliensis Vell., V. canadensis (L.) Britton, V. caroliniana L., V. chamaedrifolia Juss., V. hispida Ruíz & Pav., V. littoralis Kunth, V. officinalis L., V. phlogiflora Cham., V. scabra Vahl, V. teucrioides Gill. & Hook., V. venosa var. reineckii Briq., Stylodon carneus (Medic.) Moldenke, S. carneus Moldenke, and Lippia sp. On the other hand, the Kaspiew 1469 distributed as V. rigida is actually V. bonariensis L., Archer 4821 is V. intercedens Briq.,

Bertoni 1156 & 2508, Montes 1058 & 9347, Pedersen 5205, Ruiz Huidobro 4607, J. G. Schwarz 1249, 1319, & 2081, and Schwindt 271 are V. rigida var. obovata (Hayek) Moldenke, and Walther 197 (at least insofar as the Britton Herbarium specimen is concerned) is Cochranea anchusaefolia (Poir.) Gürke in the Heliotropiaceae.

The reference in Loud., Hort. Brit. Suppl. 2: 680 (1839) is sometimes credited to W. Baxter, apparently in error; Sweet, Brit. Flow. Gard., ser. 2, 4: pl. 318, is often cited as "1838" and Hook., Bot. Misc. 1: 167 as "1830", also apparently in error. Perry, on page 272 of her 1933 monograph, cites the Marnock, Floricult. Mag. illustration as "fig. 2". Marnock himself so cites it on page 87 of his work, but the numbers seem to have become transposed on the illustration and the picture of V. rigida is fig. 3 — fig. 2 represents Lythrum roseum Marnock, a name apparently overlooked by the Index Kewensis.

Bauman 5, L. H. Bailey s.n. [May 17, 1930], and Herb. Univ. Calif. L. A. s.n. [Los Angeles, April 31] do not have any indication on their labels that they originated from cultivated material, but I am assuming that they did.

Pearson (1901) cites Wilms 1176 from the Transvaal and records the species from Saint Helena. Hayek (1908) cites Campos Novaes s.n. [Campinas, XII.1900], Wacket s.n. [prope Rio Grande inter Santos et urbem São Paulo], and Wettstein & Schiffner s.n. [prope S. Anna ad flumen Tieté haud procul ab urbe São Paulo, 800 m. S. m.] from São Paulo, Brazil. Troncoso (1937) cites her nos. 375, 376, & 383 from cultivated material in Buenos Aires, Argentina; Augusto (1946) cites Borrmüller s.n. [ao norte de Pindorama] and Emrich s.n., Augusto s.n., and Edésio s.n. from Rio Grande do Sul, Brazil; and Ahles (1958) cites Correll 5348 (H) from Dorchester County, South Carolina. He also cites Ahles 12368, 12581, & 15505, but these collections are cited by me (see below) as Ahles & Bell collections.

The pollen-grain description for the species is provided by Nair & Rehman (1962) based on a specimen apparently cultivated at Lucknow, India — "NBG [National Botanic Garden] 24582; Sl[ide] 2730" — not as yet seen by me.

Perry (1933) cites the following 23 additional specimens not as yet seen by me: NORTH CAROLINA: Martin Co.: Randolph 688 (G). ALABAMA: Mobile Co.: E. W. Groves 525 (E). LOUISIANA: East Baton Rouge Par.: Billings 49 (G). Saint Tammany Par.: Arsène s.n. [Covington, Aug. 1919] (W). TEXAS: Harris Co.: E. Hall 433 (E, G); E. J. Palmer 12001 (E). Walker Co.: E. J. Palmer 12038 (E). MEXICO: Vera Cruz: Purpus 6413 (E, F, G). BERMUDA ISLANDS: Main: Brown & Britton 153 (D); Brown, Britton, & Wortley 1645 (D); F. S. Collins 45 (G), 269 (G); Harshberger s.n. [nr. Devil's Hole, June 13, 1905] (D, E, G); Moore 2984 (G). Saint David's: S. Brown 693 (D). JAMAICA: W. Harris 11969 (E, G); Perkins 1024 (G).

She says "This South American species is commonly cultivated. It has escaped and established itself in various places. Kuntze and Briquet have regarded it as a variety of V. bonariensis, but lacking a considerable amount of material for examination, the writer prefers, at present, to maintain it as a specific entity." The specimen which she cites as Langlois s.n. from "NY" is cited by me hereinafter as Langlois 49 and is deposited in the Barnard College herbarium.

In all, 715 herbarium specimens and 15 mounted clippings and illustrations, including the type collections or phototypes of most of the names involved, have been examined by me.

Citations: NORTH CAROLINA: Cumberland Co.: Ahles & Hammond 24461 (Hi--104410). Duplin Co.: Ahles & Haesloop 28470 (Hi--104409). Edgecombe Co.: Radford 36843 (Hi--104408). Forsyth Co.: P. O. Schallert 570 (Ok). Johnston Co.: Radford 21836 (Hi--92950). Martin Co.: E. J. Alexander s.n. [7/28/23] (Hi--59486); Randolph & Randolph 688 (Ba, Vi). Northampton Co.: W. H. Rhoades s.n. [near Jackson, 8-1935] (Bt--61222, Dp). Onslow Co.: Ahles & Ramseur 24192 (Hi--104407). Pitt Co.: Radford 34865 (Hi--104406). Sampson Co.: Ahles & Laing 24480 (Hi--104405); Ahles & Leisner 33653 (Hi--104404). Washington Co.: D. S. Correll 1842 (Dm, Dp, H--40241, N). SOUTH CAROLINA: Allendale Co.: Ahles & Bell 12581 (Hi--92862); A. R. Moldenke 421 (Fg). Bamberg Co.: Ahles & Haesloop 22154 (Hi--146194), 25955 (Hi--104411). Barnwell Co.: A. R. Moldenke 426 (Fg). Beaufort Co.: Ahles & Bell 12368 (Hi--92863, St). Clarendon Co.: Radford 21215 (Hi--92918). Colleton Co.: Ahles & Bell 15505 (Hi--92864); C. R. Bell 2292 (Hi--92855). Fairfield Co.: C. R. Bell 7260 (Hi--93400). Horry Co.: C. R. Bell 6220 (Hi--92949). Newberry Co.: C. R. Bell 7056 (Hi--92951). Saluda Co.: Radford 23117 (Hi--92952). GEORGIA: Bacon Co.: A. R. Moldenke 344 (Fg). Bibb Co.: Eddy s.n. [Macon, May '88] (Ob--92283); A. R. Moldenke 367 (Fg); F. H. Sargent 49 (We), 59 (W--2067070). Bleckley Co.: A. R. Moldenke 374 (Fg). Burke Co.: A. R. Moldenke 409 (Fg). Calhoun Co.: R. F. Thorne 3597 (Ca--906197, N, Vi, W--1929863). Clarke Co.: Cronquist 4144 (N, Tl, W--1927651); Holder s.n. [July 7, 1929] (Gu--E.7919); B. Maguire s.n. [May 3, 1925] (Gu--E.1054); Miller & Maguire 1264 (Ua--16577); L. M. Perry 1020 (N, W--1604745); Pyron s.n. [old reservoir, July 4] (H--1698); J. M. Reade s.n. [Athens, May 26, 1928] (Ba, N). Clinch Co.: Godfrey 58558 (N). Crisp Co.: H. H. Hume s.n. [4 mi. south of Cordele, 13 May 1937] (Fl--26628). Dodge Co.: A. R. Moldenke 373 (Fg). Dooly Co.: Fattig s.n. [Vienna, 5-3-28] (Sa); W. H. Rhoades s.n. [near Vienna, July 1929] (Bt, N). Grady Co.: Cronquist 5470 (Gu--29321); A. R. Moldenke 301 (Fg, S). Greene Co.: W. H. Duncan 1570 (N). Hancock Co.: A. R. Moldenke 394 (Fg). Jackson Co.: Boyd s.n. [May 30, 1931] (Gu--E.8505). Jeff Davis Co.:

A. R. Moldenke 355 (Fg). Jefferson Co.: A. R. Moldenke 402 (Fg); P. O. Schallert 570 (B, Hi—54946, Je—7002). Lamar Co.: Hamlin 109 (Gu—E.8028). Lincoln Co.: W. H. Duncan 10646 (No—21448). McDuffie Co.: H. H. Bartlett 1122 (Mi, Po—64522). Monroe Co.: A. R. Moldenke 381 (Fg), 386 (Fg). Pike Co.: W. A. Jenkins s.n. [near Zebulon, 5/17/36] (Ga). Putnam Co.: A. R. Moldenke 388 (Fg). Richmond Co.: T. P. Cleveland 1860 (Fl—21132). Screven Co.: A. R. Moldenke 411 (Fg). Telfair Co.: A. R. Moldenke 357 (Fg). Troup Co.: Biltmore Herb. 9585a (S). Twiggs Co.: Davis & Davis 11735 (Hi—115426); A. R. Moldenke 383 (Fg). Washington Co.: A. R. Moldenke 396 (Fg). FLORIDA: Walton Co.: E. G. Hume s.n. [Northwest Walton Co., 5/11/38] (Fl—29766). ALABAMA: Crenshaw Co.: C. T. Reed 2087 (Au). Mobile Co.: Crawford, Harvill, & Segars 1033 (Au—122635); E. W. Graves 525 (W—984440); W. H. Harvey s.n. (W—71949); C. T. Mohr 91 (Du—90886), 125 (W—1323138), s.n. [Mobile, May 1868] (W—147593), s.n. [Mobile, 1875] (Ka), s.n. [Mobile, 1876] (W—771880), s.n. [Mobile, May 18, 1878] (Vt), s.n. [Mobile, 1878] (Pr, Vt), s.n. [Mobile, May 1880] (Du—91138), s.n. [Mobile, April 1893] (Hi—59466), s.n. [Mobile] (Mi, Pa). Sumter Co.: Crawford & Harvill 1071 (Au—122633); R. M. Harper 3186 (Ba, N, Se—15932). Dauphin Island: S. B. Jones 600 (Hi—210618). MISSISSIPPI: Adams Co.: A. R. Moldenke 734 (S). Claiborne Co.: F. A. Cook s.n. [Grand Gulf, June 15, 1925] (W—1325892). Clarke Co.: J. D. Ray 5070 (Hi—199560, N). Forrest Co.: F. H. Sargent s.n. [Hattiesburg, Sept. 16, 1931] (N). Hancock Co.: Demaree 31888 (Sm). Hinds Co.: Mabel Parke 27583 (Tr—16218). Jefferson Co.: McDougall 1081 (W—1925263), 1290 (W—1925705); A. R. Moldenke 739 (S). Lincoln Co.: M. B. Flint s.n. [Brookhaven, April 15, '82] (Io—92226). Pike Co.: J. D. Ray 5459 (Hi—199685, N). Rankin Co.: Webster & Wilbur 3352 (W—2068074). Warren Co.: A. R. Moldenke 746 (S); W. H. Rhoades s.n. [near Vicksburg, July 1927; H. N. Moldenke 17081] (Br, Bt, Bt—30140, Ec, Hs, Hs, Ml, N, Nd, St, Va), s.n. [Cemetery, Vicksburg, July 1931] (Bt, N, Ob—50856), s.n. [National Cemetery, Vicksburg] (Hs). ARKANSAS: Craighead Co.: Demaree 24920 (Sm). LOUISIANA: Ascension Par.: Penfound s.n. [March 24, 1937] (Tl). Claiborne Par.: W. H. Rhoades s.n. [Athens] (Hs). East Baton Rouge Par.: Correll & Correll 9118 (H—78634, N, N), 10449 (H—78936, N, N); S. W. Hutchinson 7882 (En); Joor s.n. [Baton Rouge, June 11, 1874] (Mi, Pa); A. L. Richardson 36 (Ur). East Feliciana Par.: W. H. Rhoades s.n. [Ethel, July 1931] (N, Up). Orleans Par.: D. Hummel s.n. [17/4/1958] (S). Plaquemines Par.: Langlois 49 (Bc), s.n. [21.VII.1879] (I), s.n. [June 1880] (Ca—192902), s.n. [July 1883] (Al), s.n. [Pointe a la Hatche, 21.VII.1885] (Mi, N, Pa);

H. R. Reed s.n. [Belle Chasse, 1 May 1933] (W--1600285). Saint Mary Par.: Correll & Correll 9346 (H--78935); G. L. Fisher 35011 (Ew), s.n. [Morgan City, Apr. 21, 1935] (Gg--267618, Hp); Lambert & Lambert s.n. [September 1, 1938] (Up); Perkins & Hall 2634 (Po-256896, Um--21); W. H. Rhoades s.n. [Paterson, Aug. 1936] (Bt, N). Saint Tammany Par.: Arsène 11080 (W--1031574), 12268 (W--1033055); Bomhard s.n. [Mar. 28, 1927] (Cm); Cocks s.n. [Slidell, April 1901] (Tl), s.n. [May 10, 1901] (Tl); T. F. Hall s.n. [April 25, 1939] (Tl); A. R. Moldenke 242 (Fg); F. W. Pennell 4204 (Mi, N, Up--62326). Terrebonne Par.: Arceneaux 25 (It). Washington Par.: H. P. Riley s.n. [May 9, 1937] (Se--47523). West Feliciana Par.: Een s.n. [31.3.1951] (S); Ewan 18744 (Tl); Penfound s.n. [April 4, 1936] (Tl); F. W. Pennell 4332 (N, Up--62322). Parish undetermined: Dormon s.n. [South La., April 1930] (N). TEXAS: Brazoria Co.: H. B. Parks s.n. [Cory 29582] (N); Tharp s.n. [7/2/39] (Au, Au, Au, Mi, N, Sm). Cherokee Co.: H. J. Hamby 1764 (Ar--251841). Fort Bend Co.: Tharp 253 (Au), s.n. [7/2/39] (Au). Galveston Co.: Mally s.n. [Hulen, Sept. 22, 1895] (W--227686); Mrs. A. F. Nelson s.n. [4-20-42] (Au, N, Sm); E. C. Smith s.n. [Dickinson Bayou, 5-2-1942] (Fc). Harris Co.: C. C. Albers 35004 (Au); Barclay & Perdue 744 (Ld); R. Bebb 1240 (Ok, Ur); G. L. Fisher 460 (W--503510), 625 (W--503560), 51001 (Go, S), s.n. [May 28, 1913] (Vi), s.n. [Hosuton, Sept. 14, 1913] (Hp), s.n. [Houston, Apr. 11, 1930] (Bt--35995, Ew, Gg--222544), s.n. [Sept. 10, 1932] (Du--230450, I, Ms), s.n. [Hosuton, May 5, 1947] (B, Go); E. Hall 433 (N, Pa, Po--71137, W--227686), s.n. [Hosuton, 1872] (N); E. J. Palmer 12001 (Ca--425604); Reid 8745 (Au); Small & Wherry 11813 (N, W--1738887); Thurow s.n. [Houston, Sept. 25, 1915] (W--865599), s.n. [Houston Heights, April 28th, 1923] (Hu); Warner s.n. [near Houston, May 20, '40] (Hu). Jefferson Co.: J. F. Brenckle 48072 (N); Lundell & Lundell 11206 (N, Rf); Parks & Cory 11282 (Tr). Lee Co.: J. F. Brenckle 48077 (N). Montgomery Co.: McLeod s.n. [near Conroe, May 15, 1960] (Au--184048). Orange Co.: M. S. Young 662 (Au, Au, Po--161331, W--1104638, Wi, Wi), s.n. [Orange] (Io--104883). San Augustine Co.: C. D. Smith 26 (Nb). San Jacinto Co.: Gould & Reeves 8230 (Au--199210). Shelby Co.: Cory 56512 (W--2007875); Lundell & Lundell 10502 (Ld, N, W--1887685). Travis Co.: Herb. Univ. Texas s.n. [Austin, 5/2/35] (Au); Tharp s.n. [Austin, 5/2/35] (Au, Bt--2523, St--9281). Tyler Co.: Tharp, Turner, & Johnston 54841 (Au--122628, St). Walker Co.: E. J. Palmer 12038 (Ca--425605); Parks & Cory 2035 (Tr), 7880 (Tr), 7881 (Tr). Waller Co.: Correll & Rollins 21061 (Ld); Cory 54253 (No--14791, Rf, St). County undetermined: C. C. Albers 39008 (Au, Au). CALIFORNIA: Sonoma Co.: M. S. Baker 7503

(Gg—2182h2). MEXICO: Vera Cruz: Purpus 6h13 (Bm, Ca—169h91, N, W—566990), 15705 (Ca—h6h353), s.n. [Zacuapan, May 1919] (Ca—200693). COSTA RICA: Cartago: H. Pittier 2929 (Br). BERMUDA ISLANDS: Main: S. Brown 153 (N); Brown, Britton, & Wortley 1645 (N); F. S. Collins 269 (N, W—717563); O. Degener 1301 (N), s.n. [July 24, 1921] (Ms); Harshberger s.n. [nr. Devil's Hole, June 13, 1905] (Up—h3130, W—847617); McCallan s.n. [Agric. Experiment Station, July 4, 1921] (Ba), s.n. [July 1921] (Ba). Saint David's: S. Brown 693 (N, W—1341054). Saint George's: W. R. Taylor h9-1189 (Mi). CUBA: Oriente: Clément 6624 (W—1959956); Ekman 8067 (S), 8769 (S); Herb. Estac. Exp. Agronom. 14776 (Es); Hioram & Maurel 2520 (N); León 3910 (Ha, N); López Figueiras 2615 (W—2226679). JAMAICA: N. L. Britton 3176 (N); Chrysler 1401 (Ru); W. Harris 11969 (Gg—31389, N, S, W—791016), s.n. [23/10/1912] (N); W. R. Philipson 689 (N). LEEWARD ISLANDS: Guadaloupe: Duss 3470 (N, N, N); Questel 3855 (N). WINDWARD ISLANDS: Martinique: Duss 4697 (N, N). BRAZIL: Minas Gerais: Campos Porto 1839 [Herb. Rio de Jan. 26050] (B); Mello Mattos s.n. [Itabira do Campo, June 1902; Herb. Rio de Jan. 46762] (N); Mexia 5387a (N). Paraná: Dusén 3638 (Ja—46571, N, S), 7786 (N, S), 8772 (S), 8825 (N, S, W—1481762), 13329 (S), 15793 (S, W—1481767), s.n. [Herb. Rio de Jan. 3638] (N); Hatschbach 1617 (N); Mello Mattos 4702 (N); E. A. Moreira 60 (W—2369338); Stellfeld 28 [Herb. Mus. Paran. 1397] (N), 1397 (S); Tessmann 2788 (S), s.n. [Herb. Mus. Paran. 2788] (N). Rio de Janeiro: Herb. Rio de Jan. 31554 (N); Sampaio 1920 (Ja—31554), 2351 (Ja—46503). Rio Grande do Sul: Jürgens 223 (B), 451 (B), 463 (B), s.n. (B); Leite 246 (N); Lindman A.473 1/2 (N, S, S); Malme 504 (S), 504a (S), 1046 (S), 1145 (S); Moldenke & Moldenke 19689 (B, Es, F, Fy, Hw, Lg, Ln, Mg, Mr, N, No, Ot, Rs, S, Sm, Ss); Rambo 439 (N), 9990 (Sp—50992), 27143 (N), 27286 (N), 29121 (N), 34723 (S), 34727 (N, S), 51646 (W—2102123), 51647 (S), 57248 (S); Reineck & Czermak 68 [Herb. Osten 4158] (N, S, Ug); A. R. Schultz 409 (N); Schwacke 2759 [Herb. Saldanha 5070] (Ja—46580); Sehnem 3505 (B, Gg—356411, N); J. Vidal s.n. [Allemoa, March 1939] (Ja—46558), s.n. [Santa Maria do Boca do Monte, March 1939] (Ja—46547, Ja—46549). Santa Catarina: Dusén 17889 (S); Moreira & Moreira 235 (Gg); Reitz 4515 (Rd), C.1407 (N), C.1497 (N, S); Schwacke 183 [Herb. Mus. Nac. Rio ref. no. III] (Ja); L. B. Smith 5810 (W—2120177, Z); Smith & Klein 7488 (N, Ok, W—2251284); Smith & Reitz 10200 (W—2249368). São Paulo: Araujo 4 (Sp—24000); Brade 5742 (N, S, Sp—6714), 5769 (S); Campos Novaes 918 (W—389888); Campos Porto 2983 [Herb. Rio de Jan. 32605] (B, N); Dedecca s.n. [Herb. Inst. Agron. S. Paulo 8150] (Be—37287); Edwall s.n. [Capital, Oct. 18, 1893; Herb. Com. Geogr. & Geol. 653] (N, Sp—15673); Herb. Jard. Bot. Rio de Jan.

1406 (N); F. C. Hoehne s.n. [Butantan, Nov. 7, 1917] (N, Sp--870), s.n. [Itapira, May 14, 1927] (Sp--20304), s.n. [Serra Negra, June 1, 1927] (Sp--20644), s.n. [Serra Negra, June 3, 1927] (N, Sp--20696); Hoehne & Gehrt s.n. [Caraguatatuba, Dec. 8, 1939] (N, Sp-41852); Kiehl & Castro s.n. [Herb. Inst. Agron. S. Paulo 3777] (N, W--1775580); Kiehl & Franco s.n. [Herb. Inst. Agron. S. Paulo 5161] (N, Sp--44300); M. Kuhlmann 77 (Sp--47879), 481 (N); Leite 3726 (El); B. Lutz s.n. [Serra da Bocaina, Jan. 1925] (Ja--15093); Luederwaldt s.n. [Ipiranga; Herb. Mus. Paulista 92] (N, Sp--15716); Pickel 1760 (N, Sf), 1878 (Sf), 5165 (Sp, Sp--44947), 5491 (N); Russel 104 (N, Sp--20064); Sampaio 4395 (Ja--46507); Santoro 735 (N), s.n. [Campinas, 28 Fev. 1936; Herb. Inst. Agron. S. Paulo 392] (Ba, N, W--1593220), s.n. [Herb. Inst. Bot. S. Paulo 735] (W--1594593); Usteri s.n. [Capital, 1905; Herb. Polytech. S. Paulo 247b] (N, Sp--15711); Viegas & Zagatto s.n. [Jaguari, 10 Jan. 1939; Herb. Inst. Bot. S. Paulo 3792] (W--1775583). State undetermined: Sellow 428 (Vt), s.n. [Bras. merid.; Macbride photos 17444] (Br, F--photo, Kr--photo, N, N--photo, N--photo, N--photo, N--photo, Si--photo, Vt, Z--photo, Z--photo), s.n. [Brasilia] (N). BOLIVIA: Chuquisaca: Troll 53 (B). Santa Cruz: Cárdenas 5192 (W--2250729); T. Herzog 1696 (S); Steinbach 6052 [Herb. Inst. Miguel Lillo 38012] (N). PARAGUAY: Fiebrig 6305 (W--1134887); Grosse & Lindman 3899 (Ja--28233); Hassler 1560 (N), 6508 (N, S); Jörgensen 3770, in part (N, S, W--1483809), 3790 (Du--197902); Kuntze s.n. [Sud Paraguay, IX.92] (N, N, W--701064); Lindman A.3899 (N, S); A. Lutz 1482 (Hk); Morong 1541 (C); T. Rojas 3407 [Herb. Osten 18195] (Ug), 13118 (N), s.n. [Hassler 216a; Herb. Osten 15645] (N, Ug). URUGUAY: Archer 4452 (W--1705455); Arechavaleta s.n. [Herb. Osten 3747] (Ug); H. H. Bartlett 21005 (Mi); Berro 2362 (N), 5535 (N), 7856 (N); Cantera 34 (Ug, Ug, Ug); Castellanos s.n. [Playa Atlántida, Dec. 29, 1946; Herb. Inst. Miguel Lillo 15164] (N, N), s.n. [Arroyo Catalancito, Jan. 30, 1948; Herb. Inst. Miguel Lillo 15049] (N); Collector undesignated s.n. [Marzo 10 de 1885] (Ug), s.n. (Ug, Ug); Hauman s.n. [Montevideo, XI/1922] (Br); Herter 268c [Herb. Herter 80738] (He), s.n. [Herb. Osten 17051] (Ug); Kuntze s.n. [Sierra de Solis, Nov. 1892] (N, N, N); Legrand 3492 (Ug), 4189 (Ug); Lombardo 442 (N); Müller & Melchers s.n. [Herb. Inst. Miguel Lillo 11762] (N); Osorio s.n. [Valle Eden, Feb. 19, 1947] (N, Ug--13851); Osten 3864 (Ug), 5302 (W--1134904), 11636 (Ug), 11637 (Ug), 16049 (Ug); Rosengurtt B. 1920 (N, N, Ug--5609), B.2705 (N), B.2869 (N), B.3035 (N), B.5301 (W--2048512), s.n. [H. N. Moldenke 11203] (N); Schröder s.n. [Herb. Osten 19454] (Ug); Tappen s.n. [Herb. Osten 5302] (Ug). ARGENTINA: Buenos Aires: Gillies s.n. [Macbride photos 34349]

(Kr—photo, N--photo); Parodi 7382 [Herb. Osten 20939] (Ug). Chaco: Jörgensen 2464 [Herb. Inst. Miguel Lillo 31553; Herb. Osten 11869] (N, Ug); T. Meyer 289 (Ug—10941); A. G. Schulz 1480 (N); Venturi 5 (W—1043590). Córdoba: A. T. Hunziker 7134 (N). Corrientes: Ibarrola 3393 (N), 3505 (N), 3869 (N); Parodi 12623 (N). Entre Ríos: T. Meyer 10097 (N). Formosa: Jörgensen 2637 [Herb. Osten 11553] (Ug). Misiones: Bertoni 2009 (Au—122637, N), 2961 (N, Rf); Burkart 11067 (N), 11762 (W—1858339); Ekman 1981 (S), 1982 (Mi, N, S), 2028 (S); Grtner 90 [Herb. Osten 23177] (Ug); Lilliesköld s.n. [vicinity of Colonia Bonpland] (S); Medina 37 (N); Montes 665 (Bm, S), 2152 (N); D. Rodriguez 545 [Herb. Inst. Miguel Lillo 31558] (Ca—3316, N, Ug—4935, W—1858284); Ruíz Huidobro 5083 (N); Sandeman 4792 (K); G. J. Schwarz 1299 (N, S). Tucumán: Venturi 2731 [Herb. Osten 17251] (N, S, Ug, W—1591265). ZORES ISLANDS: Faial: Persson s.n. [3/5/1937] (Go). MADEIRA: J. Bornmüller 1140 (Br); Gonçalves da Costa s.n. [S. Martinho, Maio 1937] (Go); Mandon s.n. [23 Feb. 1865] (N); E. Wall 5 [12/329] (Ew), 5 [28/329] (Ew). SWEDEN: A. Andersson s.n. [Sept. 1932] (Gg—222543); Blom s.n. [Götteborg, 14/9/1930] (Go, S, S). SWITZERLAND: H. Beger s.n. [Zurich, 13.7.12] (B); R. Probst s.n. [27.8.30] (Pb). REPUBLIC OF SOUTH AFRICA: Basutoland: Dieterlen & Dieterlen 997 (Br). Cape of Good Hope: E. Wall 5 [Douglas] (Ew); Sidey 1165 (S). Transvaal: T. J. Jenkins s.n. [XII.1911; Herb. Transvaal Mus. 10933] (Z). Province undetermined: Krook s. n. [Penther 1764] (S, S). INDIA: Madras: Anglade 625 (Ca—262525); Bembower 319 (Ca—495740, N), 386 (Mi); E. W. Erlanson 5613 (Mi, N); Meebold 11522 (S), 11592 (S); Saulière 267 (Ba—23745, Ba—23746). WESTERN PACIFIC ISLANDS: RYUKYU ISLAND ARCHIPELAGO: Okinawan Islands: Okinawa: Walker, Tamada, & Amano 5976 (N). HAWAIIAN ISLANDS: Hawaii: G. R. Ewart III.193 (Bi); Hosaka 2247 (Bi, Bi). AUSTRALIA: New South Wales: Herb. Prager 18626 (Gg—31285); A. Morris 2229 (N); Rodway 327 (Gg—229701); Tilden 610 (Bl—42352, Cm); Valentin s.n. [Dec. 12, 1927] (S). Queensland: M. S. Clemens s.n. [Oct. 12, '43] (Or—47763), s.n. [March 1947] (Or—55498), s.n. [Maryborough, October 1948] (Mi); Cribb & Newton s. n. [Mount Glorious, Nov. 1950] (Bm); C. E. Hubbard 4824 (S); L. S. Smith 3068 (N). Victoria: Valentin s.n. [24/3/1928] (S). CULTIVATED: Argentina: Ruíz Leal 13861 (Ss). Belgium: Herb. Jard. Bot. Brux. s.n. (Br); Lejeune s.n. [hort. Millet 1838] (Br); M. Martens s.n. (Br). Brazil: F. C. Hoehne s.n. (N, Sp—15721). California: Bailey & Bailey 7750 (Ba); Bracelin 1306 (Gg—339914, Go), 2307 (Gg—347732, Go, N); Eastwood s.n. [San Francisco, May 20, 1915] (Gg—31387), s.n. [San Francisco, Aug. 1919] (Gg—31388); C. Hart s.n. [May 20, 1930] (Gg—174603); Herb. Univ. Calif. Los Angeles

s.n. [September 7, 1943] (La), s.n. [Los Angeles, April 31] (La); S. W. Hutchinson s.n. [15 August 1937] (En, La); K. D. Jones 1642 (Gg—177510); E. Kemp s.n. [Sacramento, 9.V.35] (Ca—591525); Walther 197 (N). Dominican Republic: J. de J. Jiménez 4631a (Jz). England: L. H. Bailey s.n. [Kew, Aug. 8, 1919] (Ba); Herb. Roy. Hort. Soc. Garden Wisley s.n. [July 8, 1936] (Ba); Nelmes 1152 (Ba); Stearn s.n. [Moldenke & Moldenke 9157] (N). France: Laplace 3888 (La), s.n. [Duffour 3888] (Vi). Germany: Collector undesignated 2109 (S); "H. G." 26 (Bm); Herb. Martius s.n. [h. Monac. 1840] (Br), s.n. (Br); Herb. Prager 18641 (Gg—31425); C. J. Meyer s.n. [München, Juli 1897] (Mi); Mühlbach s.n. [Potsdam, 7 August 1942] (B). Hawaiian Islands: C. H. Hitchcock s.n. [Kauai] (Dt). Illinois: E. E. Green s.n. [Garfield Park, July 24, 1935] (Ba); Herb. Div. Floric. Univ. Ill. 273 (Ur), 274 (Ur), 869 (Ur). India: Herb. Hort. Bot. Calcutt. s.n. (Bz—23747). Italy: Herb. Harvey s.n. [hort. Bellovacens, jun. 1842] (Du—166457); Vignolo-Lutati s.n. [VI.1931] (N). Java: Hallier D.588a (Bz—23742, Bz—23743), D.588b (Bz—23744); Herb. Hort. Bot. Bogor. XV.K.A.XLV.5 (Bz, Bz—26430), 11 (Bz, Bz—26438). Maryland: W. H. Cowgill 568 [U. S. Pl. Introd. 121505] (Oa—9236); McCann s.n. [9-15-36] (Md). Massachusetts: L. H. Bailey s.n. [Cambridge, Aug. 31, 1921] (Ba), s.n. [Cambridge, August 6—12, 1929] (Ba); Leavitt s.n. [Cambridge, 11 Oct. 1898] (Rf, Rf). Michigan: Kniper 7191 (Mi). New Jersey: H. N. Moldenke 9289 (N). New York: L. H. Bailey s.n. [Sept. 25, 1922] (Ba), s.n. [C. U. greenhouses, May 7, 1923] (Ba), s.n. [C. U. gardens, Aug. 14, 1925] (Ba), s.n. [Ithaca, Oct. 10, 1934] (I), s.n. [Vilmorin-Andrieux & Cie. seed 80080] (Ba); Bastedo s.n. [21.S.1897] (N); Burdick s.n. [Sept. 26, 1922] (Ba); Kalergi s.n. [7/24/42] (N); H. N. Moldenke 8074 (N), 10611 (N); Moldenke & Moldenke 11891 (N); Nanton s.n. [9/3/40] (N); G. V. Nash s.n. [N. Y. Bot. Gard. Cult. Pl. 44553] (N), s.n. [22.S. 1898] (N); R. C. Schneider s.n. [N. Y. Bot. Gard. Cult. Pl. 26941] (N); L. S. Slater s.n. [August 24, 1922] (Al); Van Melle s.n. [Poughkeepsie, 1931] (Ba); M. Zimmerman 54 (Ba). North Carolina: L. H. Bailey s.n. [May 17, 1930] (Ba); W. C. Coker s.n. [Oct. 2, 1936] (Hi, Hi—58481); P. O. Schallert s.n. [9/30/38] (Ky). Oklahoma: O. H. Calvert 219 (St—24365). Pennsylvania: I. Burk s.n. (Up—17129); Martindale s.n. [July 1876] (Pr). Peru: Soukup 2912 (N). Russia: Herb. Hort. Bot. Petrop. s.n. (W—71948). Spain: Herb. Hort. Matrit. 33 (Q). Sweden: Alm s.n. [18. VIII.1947] (Bm); Bauman 5 (Ew); Blom s.n. [1931] (Go); Herb. Mus. Bot. Stockholm s.n. [1844] (S); Regnell s.n. [7/1897] (S); Reuterman s.n. [13/9/1886] (Go); Trolander s.n. [Juli 1935] (Ew); E. Wall 5 [18/844] (Ew), 5 [26/841] (Ew), s.n. [24/740] (Ew). Switzerland: Herb. Hort. Basil. s.n. [Jun. 1830] (Mi), s.n. [Aug. 1839]

(M). Texas: E. Hall s.n. (W—71978). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated 49 (Q); Dunlop s.n. [Aug. 1890] (Mi); Dusén 64 (Ja—46561); R. T. Lowe 990 [Valle Ganden] (Pa); Miers s.n. [Zanjon, Desmochadez] (Bm); Tweedie s.n. (S). MOUNTED ILLUSTRATIONS: Gard. Chron., ser. 3, 76: 279, fig. 99. 1924 (Ba); G. V. Nash s.n. [N. Y. Bot. Gard. Cult. Pl. 44553] (N); fig. 25690 (N). MOUNTED CLIPPINGS: Gard. Chron., ser. 3, 76: 279. 1924 (Ba).

VERBENA RIGIDA var. ALBA (Trivetts) Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2212. 1951.

Synonymy: Verbena venosa alba Trivetts, Cat. Suppl. 1933 Novelty List 6. 1933; Moldenke, Alph. List Invalid Names Suppl. 1: 27 [as "Triretts"], in syn. 1947; Moldenke, Résumé 378, in syn. 1959.

Bibliography: Trivetts, Cat. Suppl. 1933 Novelty List 6. 1933; L. H. Bailey, Cat. Florists Handl. Verbenac., mss. 1935; Moldenke, Alph. List Invalid Names Suppl. 1: 27. 1947; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2212. 1951; Moldenke, Journ. Calif. Hort. Soc. 15: 80. 1954; Moldenke, Résumé 224, 378, & 473. 1959.

Haec varietas a forma typica speciei corollis albis recedit.

This variety differs from the typical form of the species in having white corollas.

Bailey (1935) lists this as only offered to the horticultural trade by Trivetts, but I am not certain that the reference given above is actually the original publication by Trivetts. In my 1947 publication I accidentally misspelled the author name as "Triretts" and reduced the trinomial to synonymy under V. rigida Spreng.

As yet I have not seen any material which was definitely this variety.

VERBENA RIGIDA var. GLANDULIFERA Moldenke, Phytologia 6: 331. 1958.

Synonymy: Verbena rigida f. glandulosa Moldenke ex J. A. Clark, Card Index Gray Herb. issue 229. 1958.

Bibliography: Moldenke, Phytologia 6: 331. 1958; J. A. Clark, Card. Index Gray Herb. issue 229. 1958; Moldenke, Résumé 111 & 473. 1959; Angely, Fl. Paran. 16: 79 (1960) and 17: 47. 1961; Moldenke, Résumé Suppl. 7: 9. 1963.

This variety differs from the typical form of the species in having the peduncles, rachis, bractlets, and calyxes densely glandular-puberulent, and the bractlets only very shortly and sparsely ciliolate.

The type of the variety was collected by Gert Hatschbach (no. 4212) along the roadside at Laranjeiras do Sul, in the municipality of Guarapuava, Paraná, Brazil, on November 15, 1957, and is deposited in the Moldenke Herbarium at Yonkers, New York. Only 2 herbarium specimens, including the type, have been examined by me.

Citations: BRAZIL: Paraná: Hatschbach 4212 (Z--type), 4213 (Ok).

VERBENA RIGIDA var. LILACINA (Benary & Bodger) Moldenke, Phytologia 5: 133. 1955.

Synonymy: Verbena venosa lilacina Benary & Bodger ex Harrow, Journ. Roy. Hort. Soc. Lond. 61: 401. 1935. Verbena rigida var. lilacina Hort. ex Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 74 & 102. 1942. Verbena venosa lilacina Dreer ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947; Pearce, 1964 Garden Aristocrats 20. 1964. Verbena rigida lilacina Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209. 1951. Verbena rigida lilacina Hort. ex Moldenke, Résumé Suppl. 3: 40, in syn. 1962.

Bibliography: Purdy, Perenn. Pl. Fall 1928 Spr. 1929, p. 53. 1928; Farrington, N. Y. Herald Trib. April 29. 1934; Harrow, Journ. Roy. Hort. Soc. Lond. 61: 401. 1935; L. H. Bailey, Cat. Florists Handl. Verbenac. mss. 1935; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 74 & 102. 1942; Moldenke, Alph. List Invalid Names Suppl. 1: 27. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 164 & 199. 1949; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; Moldenke, Journ. Calif. Hort. Soc. 15: 80. 1954; Moldenke, Phytologia 5: 133. 1955; Moldenke, Biol. Abstr. 30: 1092. 1956; Moldenke, Résumé 224, 373, 378, & 473. 1959; T. H. Everett, New Illustr. Encycl. Gard. 13: pl. 11-11a. 1960; Moldenke, Résumé Suppl. 3: 29 & 40 (1962) and 7: 9. 1963; Pearce, New High-lights in Fls. 20. 1963; Pearce, 1964 Garden Aristocrats 20. 1964.

Illustrations: T. H. Everett, New Illustr. Encycl. Gard. 13: pl. 11-11a [in color]. 1960.

This variety is said to differ from the typical form of the species in having its corollas lavender-blue or very pale lavender-lilac, rosy-lilac, "near to sky-blue", or mineral violet (no. 635/3 in the Royal Horticultural Society Colour Chart, 1938--42).

The plant is described as growing 1 to 2 1/2 feet tall, and has been collected in anthesis in June in California.

It is not at all certain how much variation there actually is in the color of the flower of this horticultural variety, and how much of the apparent variation mentioned above is due to varying color-concepts in the minds of botanical and horticultural observers and collectors, or even to color-blindness. It may well be that some or many of the specimens cited under typical V. rigida Sprang. actually belong in this variety and that some of the apparent color variations listed there actually belong here.

The first description of the variety known to me is the one by Purdy (1928) who has this to say of it: "hardy, with quite a little cold. It propagates by underground runners to make masses. The flowers are lilac and quite pretty." He charged 25 cents per plant, $2.50 per dozen plants. Farrington (1934) is the first person known as yet to me to have published the varietal epithet,

but this was done in a newspaper column and therefore is of doubtful nomenclatural standing. He says of the plant "A variety of this verbena which is somewhat new is called Venosa lilacina and will be prized for its color, a very delicate shade of lavender blue. Like the original venosa, it is good for beds and borders, and even for the rock garden."

In my 1942 work I used the name "Verbena rigida var. lilacina Hort." before I had determined the basinym. Even now, it is not at all certain to me that the variety should be credited to Benary & Bodger in the 1935 reference given above. It may very well have been named and described earlier by these authors elsewhere, or by someone else even earlier.

Harrow (1935) says of it: "Characters of V. Venosa, but flowers very pale lavender-lilac", and that the seeds were obtained from Benary & Bodger. Bailey (1935) states that it is offered by Dreer and by Schling. Pearce (1963) calls it a verbena "of merit..... usually grown as annuals.....perennial in mild climates....12". Showy long-bloomer, near to sky-blue. Tubers will winter-store" and sells it for 25 cents per package of seeds.

Only 2 herbarium specimens definitely of this variety have been examined by me.

Citations: CULTIVATED: California: Bracelin 2113 (Gg--347724, Go).

VERBENA RIGIDA var. OBOVATA (Hayek) Moldenke, Rev. Sudam. Bot. 5: 2. 1937.

Synonymy: Verbena rigida f. obovata Hayek in Engl., Bot. Jahrb. 42: 162. 1908.

Bibliography: Hayek in Engl., Bot. Jahrb. 42: 162. 1908; Moldenke, Rev. Sudam. Bot. 5: 2. 1937; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 41 & 102. 1942; Moldenke, Alph. List Invalid Names Suppl. 1: 26. 1947; Moldenke, Alph. List Cit. 1: 264. 1946; Moldenke, Phytologia 2: 337. 1947; Moldenke, Castanea 13: 119. 1948; Moldenke, Alph. List Cit. 3: 781 & 782 (1949) and 3: 1256. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 99, 100, 107, & 199. 1949; Moldenke, Résumé 111, 118, 120, 128, 373, & 473. 1959; Moldenke, Résumé Suppl. 7: 6. 1963.

This variety differs from the typical form of the species in having its leaf-blades in general quite decidedly obovate, rather obtuse at the apex, widest above the middle, narrowly cuneate to the abruptly rounded base. The corolla is described as violet or red-violet to purple, lilac, rose, or blue.

The type of this variety was collected by Emil Hassler (no. 8911) in the vicinity of Caaguazu, Paraguay. The variety has been found in medium-dry to moist generally sandy grasslands, on campos, in thickets and arroyos, and along riverbanks, from 200 to 900 meters altitude, blooming from December to April, June, July, September, and October, and fruiting in June. Herbarium material has been misidentified and distributed under the names V. rigida Spreng. and V. venosa Gill. & Hook. The variety is not well-marked and it is possible that some of the specimens cited by me

under typical V. rigida, especially those from Paraguay and Misiones, actually belong here.

In all, 30 herbarium specimens, including the type collections of all the names involved, and 2 mounted photographs have been examined by me.

Citations: BRAZIL: Santa Catarina: Smith & Klein 11968 (W—2251838, Z). PARAGUAY: Hassler 6508 (Ca—944359), 8911 (N—isotype, N—photo of isotype, V—isotype, Z—photo of isotype); Pedersen 5205 (S). URUGUAY: Osten 6569 (Ug), s.n. [near Piriapolis, March 30, 1911] (Ug). ARGENTINA: Misiones: Bertoni 1156 (N), 1513 (Ca—164687), 2508 (N); Ekman 1973 (Mi, N, S); T. Meyer 6659 (Ut—115408b); Montes 1058 (N, N), 2404 (N), 9347 (Au—122909, Lu, Lu); J. G. Schwarz 1249 (N, S, S), 1319 (N), 2081 (N); Schwindt 271 (N). San Mateo Island: Ruíz Huidobro 4607 (Au—122636, N, Ok).

VERBENA RIGIDA var. REINECKII (Briq.) Moldenke, Phytologia 2: 150. 1946.

Synonymy: Verbena venosa var. reineckii Briq., Ann. Conserv. & Jard. Bot. Genèv. 3: 164. 1899. Verbena bonariensis var. reineckii Briq., Arkiv Bot. 2 (10): 10, in syn. 1904. Verbena rigida var. latifolia Hassler ex Moldenke, Résumé 373, in syn. 1959.

Bibliography: Briq., Ann. Conserv. & Jard. Bot. Genèv. 3: 164. 1899; Briq., Arkiv Bot. 2 (10): 10—11. 1904; Moldenke, Phytologia 2: 150. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 22 & 28. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 78. 1948; Moldenke, Alph. List Cit. 4: 1247. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 99 & 199. 1949; Moldenke, Phytologia 3: 454. 1951; Moldenke, Résumé 111, 118, 359, 373, 378, & 473. 1959; Moldenke, Résumé Suppl. 3: 15. 1962.

This variety differs from the typical form of the species in having its leaves much thinner in texture, much less firm and rigid, more broadly elliptic in shape, and less scabrous above, the venation much less prominent beneath.

The plant is described by collectors as suffrutescent, 0.8—1 m. tall, with blue-purple flowers.

The type of the variety was collected by Eduard Martin Reineck and Josef Czermak (no. 55) at Belém Velho, Rio Grande do Sul, Brazil, on October 31, 1897, and is deposited in the Delessert Herbarium at the Conservatoire et Jardin Botaniques at Geneva. I have not as yet seen the type, but the several collections cited below apparently represent the same taxon. The type of var. latifolia was collected by Teodoro Rojas (no. 3365) at the edge of woods at the foot of Cerro Acahy, Carapeguá, Paraguay, in April, 1919, and is deposited in the herbarium of the Museo de Historia Natural at Montevideo. Reineck & Czermak 68 [Herb. Osten 4158] in the Montevideo herbarium is inscribed "Verbena venosa var. reineckii var. nov.", but appears to represent the typical form of the species.

The variety has been found in swamps, on hillsides, and at the

edge of woods, flowering in April. Material has been misidentified and distributed in herbaria under the name V. venosa Gill. & Hook.

Briquet (1904) cites the Ann. Conserv. & Jard. Bot. Genèv. 3: 164 reference as "1898" and states that he named this taxon as a variety of V. bonariensis L. there, which is not so. He also notes "La distinction que nous avions faite en 1899 entre le V. venosa Gill. et Hook. type et une variété Reineckii basée sur la forme des environs de Porto Alegre, ne résiste pas à l'examen de matériaux abondants. Nous y voyons plutôt maintenant une simple forme locale."

In all, 7 herbarium specimens and 4 mounted photographs have been examined by me.

Citations: PARAGUAY: T. Rojas 3365 [Herb. Osten 18171] (N, N, Ug), s.n. [Hassler 216; Herb. Osten 15646] (Ag--photo, F--photo, N--photo, Ug, Z--photo). ARGENTINA: Corrientes: Ibarrola 3869 (Gg--353275); G. J. Schwarz 2081 (Gg--352678). Misiones: Medina 37 (Gg--353274).

VERBENA RINCONENSIS Moldenke, Phytologia 9: 100. 1963.

Bibliography: Moldenke, Phytologia 9: 100. 1963; Moldenke, Résumé Suppl. 6: 4. 1963; Moldenke, Biol. Abstr. 43: 643. 1963.

Creeping herb; stems slender, rooting, mostly procumbent; branches ascending, very slender, rather sparsely pilose with rather stiff and divergent white hairs; principal internodes elongate, 2--9 cm. long; nodes not annulate; leaves decussate-opposite, very variable in size and shape, petiolate; petioles slender, 5--11 mm. long, rather sparsely spreading-pilose with erect whitish hairs, more or less margined, especially toward the apex; leaf-blades thin-chartaceous, rather uniformly bright-green on both surfaces, ovate, 1.5--3.5 cm. long, 1.5--2.5 cm. wide, irregularly incised, the larger ones 3-lobed, rather sparsely pilose on both surfaces, the lobes and divisions oblong or ovate, mostly acute or subacute at the apex; inflorescence terminal, abbreviated, 1.5--5.5 cm. long, subcapitate in anthesis, elongate-cylindric in fruit; peduncles slender, 1--3.5 cm. long, densely white-pilose with wide-spreading rather stiff hairs; bractlets narrow-lanceolate, 4--6 mm. long, mostly divergent or even recurved, attenuate-acute at the apex, pilosulous on the back, long-ciliate; calyx cylindric, about 7 mm. long, rather densely subappressed-pubescent on the outer surface, plainly 5-ribbed, the teeth 5, subulate, 2 long and 3 shorter: corolla hypocrateriform, blue, its tube about 8 mm. long, venose and pilosulous on the outside toward the apex, the limb to 7 mm. wide.

The type of this species was collected by George B. Hinton (no. 8011) on a hill at Rincón, in the district of Temascaltepec, México, Mexico, on August 29, 1935, and is deposited in the herbarium of the Texas Research Foundation at Renner, Texas. The collector describes the plant as procumbent, growing on a clay hill at 1960 meters altitude, flowering in February, March, and

August. It has in the past been confused with and distributed as V. pumila Rydb.

In all, 11 herbarium specimens, including the type, have been examined by me.

Citations: MEXICO: México: Hinton 5589 (N, W--1822244), 8011 (Ca--939134--isotype, K--isotype, Ld--isotype, N--isotype, Rf--type), 8988 (K, Ld, N, W--1822294).

VERBENA RIPARIA Raf., Herb. Raf. 69, nom. nud. 1833; Small & Heller, Mem. Torrey Bot. Club 3: 12. 1892.

Synonymy: Verbena urticaefolia riparia Britton, Mem. Torrey Bot. Club 5: 276. 1894. Verbena urticifolia var. riparia Britton apud Perry, Ann. Mo. Bot. Gard. 20: 267, in syn. 1933. Verbena urticaefolia var. riparia (Raf.) Britton ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena urticaefolia var. riparia Britton ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947.

Bibliography: Nutt., Gen. 2: 40. 1818; Raf., Herb. Raf. 69. 1833; Small & Heller, Mem. Torrey Bot. Club 3: 12. 1892; N. L. Britton, Mem. Torrey Bot. Club 5: 276. 1894; Durand & Jacks., Ind. Kew. Suppl. 1: 451. 1906; Robinson & Fern. in A. Gray, New Man. Bot., ed. 7, 688 & 924. 1908; M. A. Day, Check List 128. 1908; N. Taylor, Mem. N. Y. Bot. Gard. 5: [Fl. Vic. N. Y.] 525. 1915; Perry, Ann. Mo. Bot. Gard. 20: 247, 259, 267, & 356. 1933; J. K. Small, Man. Southeast. Fl. 1137. 1933; Moldenke, Prelim. Alph. List Invalid Names 46 & 49. 1940; Moldenke, Suppl. List Invalid Names 10. 1941; Moldenke, Alph. List Invalid Names 47 & 51. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 4 & 102. 1942; Moldenke, Alph. List Cit. 1: 293 & 391. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 27. 1947; Moldenke, Alph. List Cit. 2: 470 & 508 (1948) and 3: 941 & 942. 1949; E. D. Merr., Ind. Raf. 205 & 295. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 6, 7, & 199. 1949; Fern. in A. Gray, Man. Bot., ed. 8, 1209, 1210, & 1612. 1950; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 126--128 (1952) and print. 2, 3: 126--128. 1958; Moldenke, Am. Midl. Nat. 59: 347. 1958; Moldenke, Résumé 9, 10, 366, 377, & 473. 1959; Moldenke, Résumé Suppl. 1: 1 (1959), 4: 20 (1962), and 7: 10. 1963; Gleason & Cronquist, Man. Vasc. Pl. 579 & 580. 1963; Moldenke, Phytologia 8: 488 (1963), 9: 52, 93, 203, 204, & 220 (1963), and 10: 217 & 218. 1964.

Illustrations: Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 128 (1952) and print. 2, 3: 128. 1958.

Annual herb; stems 6--15 dm. tall, erect, sparsely pubescent or glabrate, widely branched; leaves petiolate, oblong to ovate, 4--14 cm. long, 1- or 2-pinnatifid or nearly tripartite toward the base, sparsely strigillose on both surfaces, the venation prominent beneath; spikes slender, elongate, paniculately disposed; bractlets lanceolate-ovate, as long as the calyx during anthesis, acuminate at the apex; calyx to 3 mm. long, minutely

glandular-pubescent, subtruncate, the teeth minute; corolla light-blue or bluish to lavender, its tube mostly over 3 mm. long, slightly longer than the calyx, puberulent outside, its limb 3.5 mm. wide, the lobes more or less rounded, the middle posterior one emarginate or notched at the apex; cocci oblong or ellipsoid, 2--2.5 mm. long.

The species has been found in rich thickets, on riverbanks, and on the banks of streams, very local in distribution, at an altitude of 2100 feet, flowering and fruiting in June and July. Fernald, Small, and Perry all report that it grows in New Jersey, but cite no specimens from that state and I have not seen any from north of Virginia.

The name, Verbena riparia, is usually accredited to Rafinesque "ex Small & Heller, Mem. Torrey Bot. Club 3: 12. 1892", as, for instance, by Durand & Jackson (1906) and Perry (1933), but according to E. D. Merrill (1949) it was first published by Rafinesque himself (1833), although as a nomen nudum. Small & Heller (1892) give "1830" as the date for the original publication, but Merrill does not seem to substantiate this. They also claim that Rafinesque's type is preserved in the Columbia University herbarium, but I have not been able to locate it there. Merrill claims that Rafinesque based his name on material from "Long Island, New Jersey, & Chesapeake Bay", which is most amazing, since this species is known to me only from Virginia and North Carolina. Nuttall's type of V. hastata var. oblongifolia does not enter the picture because this name is only placed here in synonymy with a question by Small & Heller when Rafinesque's name was validated by a description -- this description being based on two North Carolina collections which apparently should be considered the real cotypes of the species.

The original description by Small & Heller is reproduced here: "Verbena riparia, Raf. (1830). V. hastata, L., var. oblongifolia, Nutt., Genera ii, 40 (1818)?....This brings to light another species which Rafinesque collected and named many years ago. The type is preserved in the Columbia College Herbarium, and it seems strange, but it is evident that neither Dr. Gray nor Dr. Engelmann ever saw it, for no reference is made to it in their respective works on the genus. We found it in the mountains on the banks of the John's river and in the low country at the falls of the Yadkin, in both cases true to the name which Rafinesque gave to it."

According to Harry Ahles, in a letter to me dated May 1, 1963, the first of these localities ("in the mountains on the banks of the John's river") lies in Caldwell County, North Carolina. The Small & Heller unnumbered collection, cited below, from "near Globe", is probably the actual collection here referred to and is regarded by me as the logotype of the species. Globe is situated on the John's River near the junction of Anthony Creek, in Caldwell County. The second locality ("in the low country at the falls of the Yadkin") was in Stanly County. Ahles says "The 'Falls of the Yadkin' referred to by Small were on the Yadkin River, in

Stanly Co., North Carolina, and are also referred to as the 'Rapids of the Yadkin'. They were apparently in the vicinity of Badin, North Carolina, but are now under high water from a dam that was placed on the river just below there.....In Mem. Torr. Bot. Club 3: 20-21 (1892-1893) Small mentions the Falls of the Yadkin as in the lowlands (actually Piedmont), and further states he got there by going from Salisbury to Gold Hill, thence to the Falls. This would seem definitely to tie it into the area about Badin." This specimen has not yet been seen by me.

The original Rafinesque reference reads: "Autikon Maritimum. Collection of 44 new or rare Plants from the Atlantic shores of Long Island, New Jersey, and the Chesapeak, the Sea Islands and the Pine Barrens, discovered or collected by myself between 1802 and 1833". The name, Verbena riparia, is listed without further description.

Nuttall's description reads as follows: "4. hastata. Flowers deep blue; rarely if ever hastate. Of this species there appears to be a very distinct variety near Philadelphia which I shall distinguish by the name of β.* oblongifolia, having oblong-lanceolate deeply serrated leaves, merely acute, and not acuminated; spikes filiform, paniculate; flowers smaller, pale blue. May this be V. paniculata of Lamarck? but the flowers are not imbricated, nor in the least corymbose, it appears to be equally remote from V. diffusa of the same, but assuredly intermediate, if not a hybrid betwixt V. hastata and V. urticifolia. It has only occurred to me twice on the banks of the Delaware." It seems to me much more likely that Nuttall's plant is xV. engelmannii Moldenke, as, indeed, Rafinesque's original plant may well also have been. I cannot agree with previous authorities who have placed Nuttall's name in the synonymy of V. riparia.

Dr. Small apparently also collected V. officinalis L. on the Middle Fork of the Holston River, near Marion, Smyth County, Virginia, on July 6, 1892 (which see). The leaves of the V. riparia material are considerably larger than those on the V. officinalis specimens. Fernald (1950) distinguishes these two very closely related species as follows: V. officinalis — mature calyx 2—2.5 mm. long, twice as long as the subtending bractlet; corolla purple; mature schizocarp nearly as broad as long. V. riparia — mature calyx 3 mm. long, about as long as the subtending bractlet; corolla bluish; mature schizocarp twice as long as broad.

Material of V. riparia has been misidentified and distributed in herbaria as V. scabra Vahl. Taylor (1915) reduces the species to synonymy under V. urticifolia L.

Perry (1933) cites the following 4 additional specimens not as yet seen by me: VIRGINIA: Smyth Co.: J. K. Small s.n. [Marion, 6 July 1892] (E, G). NORTH CAROLINA: Caldwell Co.: Small & Heller s.n. [near Globe, July 3, 1891] (F). Stanly Co.: Small & Heller s.n. [near falls of Yadkin, 18 Aug. 1891] (F). She says "The ma-

terial at hand is too scanty and too immature to give many clues to the probable relationship of this species. It would seem as nearly related to V. officinalis as to either V. hastata or V. urticifolia. It is characterized by pinnatifid or tripartite leaves, minutely glandular-pubescent inflorescence, and fruit about twice as long as thick."

In all, 34 herbarium specimens, including the type, have been examined by me.

Citations: VIRGINIA: Smyth Co.: J. K. Small s.n. [near Marion, June 22, 1892] (Au, I, N, Ok), s.n. [Middle Fork, Holston River, Marion, July 1, 1892] (Ba, Ba, Ba, Cm, Cn, Fl—11173, Gg—163147, H—35984, Hi—59475, N, Ob—50829, P, Po—69312, Up, Up, W—298398, We), s.n. [Middle Fork, Holston River, Marion, July 6, 1892] (Al, C, C, Fc, Io—20755, Ob—50828, Ot, W—71939), s.n. [July 20, 1892] (Up), s.n. [near Marion, July 22, 1892] (Ca—25188). Ragged Island: Fernald & Long 12453 (N). NORTH CAROLINA: Caldwell Co.: Small & Heller s.n. [near Globe, July 3, 1891] (C—logotype). LOCALITY OF COLLECTION UNDETERMINED: Herb. Bot. Mus. Lund. s.n. [North America] (Lu).

VERBENA ROBUSTA Greene, Pittonia 3: 309. 1898.

Synonymy: Verbena prostrato-stricta Palmer ex Moldenke, Résumé Suppl. 7: 9, in syn. 1963.

Bibliography: Greene, Pittonia 3: 309. 1898; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 191. 1904; Jepson, Man. Flow. Pl. Calif. 859 & 1236. 1925; Perry, Ann. Mo. Bot. Gard. 20: 248, 261, 292—293, & 356. 1933; Munz, Man. So. Calif. Bot. 437. 1935; Eastwood, Leafl. West. Bot. 3: 71. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 15, 19, 80, & 102. 1942; Jepson, Fl. Calif. 3 (2): 382. 1943; Moldenke, Known Geogr. Distrib. Verbenac. Suppl. 1: 2. 1943; Bowerman, Flow. Pl. Ferns Mt. Diablo 49, 51, 71, 72, & 221. 1944; Moldenke, Alph. List Cit. 1: 2, 43, 57, 109, 169, 177, 191, 193, 209, 220, 221, & 243. 1946; Moldenke, Phytologia 2: 326 & 330. 1947; Moldenke, Castanea 13: 113. 1948; Moldenke, Alph. List Cit. 2: 397, 398, 439, 455, 469, 474, 475, 477, 482, 483, 488, 491—495, 523, 526, 570, 571, 584, 587, 597, & 617 (1948), 3: 732, 766, 792, 841, 843, 859, 892, 946, 948, 976, & 977 (1949), and 4: 980, 982, 989, 1126, 1127, 1133, 1135, 1138, 1139, 1155, 1198, 1199, 1223—1227, 1229, 1230, 1237, 1239, 1240, 1244, 1245, 1247, 1252, 1253, & 1290. 1949; H. S. Gentry, Allan Hancock Pacif. Exped. 13 (2): 33 & 244. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 3, 27, 28, 33, 164, & 199. 1949; Moldenke, Phytologia 3: 141 (1949) and 3: 284. 1950; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; Moldenke, Am. Midl. Nat. 59: 344. 1958; Moldenke, Résumé 5, 33, 40, 224, & 473. 1959; Moldenke, Phytologia 8: 120 & 144 (1961) and 8: 278 & 279. 1962; Moldenke, Résumé Suppl. 3: 9 (1962), 5: 5 (1962), 6: 3 (1963), and 7: 9. 1963; Raven, Aliso 5: 302 & 336. 1963; Moldenke, Phytologia 8: 487 (1963) and 9: 17, 34, & 215. 1963.

Erect or semi-erect perennial, 1 1/2 to 5 feet tall, sometimes with a 3-foot spread, often stiffly erect, harshly hairy throughout, sometimes very floriferous and with the herbage quite glandular; stems sharply 4-angled, branched from the base, usually 6--9 dm. tall, erect, sturdy, robust, paniculately branched above, glabrate or sparsely hirsute; branches ascending or erect, leafy; leaves decussate-opposite, ovate or oblong-ovate, 4--10 cm. long, rounded at the apex, cuneately narrowed toward the base and into the winged petiole, bright-green on both surfaces, usually 3-cleft, irregularly serrate-dentate with sharp apiculate teeth or incised, usually rugose and scabrous-pubescent above and less harshly pubescent beneath or very rough to touch and scabrous-hirtous on both surfaces, the venation prominently reticulate; inflorescence showy; spikes panicled, often crowded, subsessile, thick, usually densely many-flowered even after anthesis but occasionally elongated, densely glandular-hispidulous throughout; bractlets lanceolate-subulate, equaling or surpassing the calyx, densely glandular-hirtellous; calyx 3--4 mm. long, densely glandular-hirsute, its lobes obtusish, terminating in very unequal acuminate-subulate teeth; corolla hypocrateriform, varying from purple or purplish to lilac, lavender, or violet, its tube 5--6 mm. long, a little longer than the calyx, puberulent on the outer surface, hairy inside, its limb 3--4 mm. wide; fruit mostly contiguous; cocci oblong-trigonous, 2--2.5 mm. long, raised-reticulate above, the striae fading out toward the base, the commissural faces more or less muricate, approximately extending to the tip of the coccus.

The type of this species was collected by Edward Lee Greene on "dry hills about San Francisco Bay, especially near Point Isabel on the eastern shore and on Pt. Tiburon", Marin County, California, "flowering in the middle of the dry season". The Greene collection cited below from this same county may represent a cotype or isotype. The type of V. prostrato-stricta was collected by Edward Palmer at San Luis Obispo, in the county of the same name, California, in 1876, and is deposited in the United States National Herbarium at Washington.

Verbena robusta differs from the closely related V. lasiostachys Link in having its corolla 5--6 mm. long, the limb 3--4 mm. wide, the bractlets lanceolate, acuminate, as long as the calyx, the leaves harshly pubescent, the habit strictly erect, and the commissural surface of the cocci densely beset with minute cylindric processes. It has been found growing in semishade in dry streambeds, rocky loam, marshy ground, fallow fields, moist soil near the mouth of canyons, dry or rocky creek beds, creek bottoms, small canyons, small ravines, gravel, salt marshes, dry clay soil around rocks, and drainage ditches in fields, at the edge of swamps, the mouths of small creeks, and springs in serpentine barrens, and on hills, dry hills, foothills, flats, sunny moist slopes, streambanks, canyon floors, and beach dunes, at altitudes of 5 to 3500 feet, flowering from April to December and fruiting from May to December. Abbott found it "common on low ground", Clokey encountered it in a "wash in streambed near

sea level". Twisselmann says that it is "scarce in mud of small pool, broken off by cattle, in full sun, in Upper Sonoran subshrub association"; Fosberg also found it "in dry creekbed in Upper Sonoran Zone." Ewan 9726 is described by the collector as follows: "herbage viscid, subslimy, plants 5 feet tall, deep gravel alluvium, leaves roughish." Bowerman (1944) says that it is "common on the margins of springs, rarely in streambeds, 500 to 3000 feet [on Mt. Diablo], June to October" associated with Juncus effusus, J. patens, Oenothera hookeri, Anagallis arvensis, and Helenium puberulum. She describes the inflorescence as "small heads of lilac flowers". A common name recorded for the species is "Catalina vervain".

Material of this species has been misidentified and distributed in herbaria under the names V. bracteosa Michx., V. ciliata Benth., V. hastata L., V. lasiostachys Link, V. lasiostachys var. scabrida Moldenke, V. polystachya H.B.K., V. prostrata R. Br., V. scabra Vahl, V. stricta Vent., and even Rumex sp. On the other hand, the Murbarger 218 and R. A. Plaskett 142, distributed as V. robusta, are actually V. lasiostachys Link, while V. F. Hesse 2606 and R. A. Plaskett 98 are V. lasiostachys var. septentrionalis Moldenke. E. K. Abbott s.n. [Monterey, 1889] is a mixture with V. abramsi Moldenke, while M. W. Williams 15 is a mixture with a species of Salvia. Wiggins & Demaree 4741 is not typical — the spikes are thin -- nor is Grant s.n. [Avalon, Aug. 6, 1902], both originally determined as V. lasiostachys var. scabrida. Rattan s.n. [Shell Mound Park, June 1880], Ferris 7656, R. J. Smith 13, and Clokey 5041 have the leaf-blades smooth (not scabrous) above. The last two of these collections are very hairy and look much like a possible hybrid with V. lasiostachys, as, in fact, the Clokey specimen in the Dudley Herbarium was actually annotated by someone. Howell 40044 is very floriferous and showy, with the herbage quite glandular.

Gentry (1949) states that the species "apparently originated on Catalina and migrated to the mainland". He claims that it is found on the Channel Islands of San Miguel, Santa Rosa, Santa Cruz, Santa Catalina, and San Clemente. Peter H. Raven, however, in a letter to me dated November 30, 1962, says "Gentry's record is undoubtedly based on that of Eastwood, Leafl. West. Bot. 3: 71. 1941. Miss Eastwood clearly states that she is including V. prostrata as reported from the islands in her concept of V. robusta, so this record is clearly based in turn on that of Munz, Manual Southern California Botany, p. 437. 1935, which correctly lists 'V. prostrata' from San Clemente Island alone, of all the California islands. Therefore, the picture seems clearly to indicate that only V. lasiostachys is on San Clemente Island, only V. robusta on San Miguel, Santa Catalina, Santa Cruz, and Santa Rosa islands." The species was apparently introduced into cultivation in 1843. Jepson (1943) cites many specimens.

Perry (1933), under V. prostrata R. Br., cites the following 3 additional specimens not as yet seen by me: CALIFORNIA: Siskiyou Co.: E. L. Greene 860 (E, F, G). Under V. robusta she cites the following 19 specimens not as yet seen by me: CALIFORNIA: Alameda Co.: Congdon s.n. [salt marshes, Oakland, Sept. 1886] (G); Engelmann s.n. [valley back of Berkeley, 23 Oct. 1880] (E); E. L. Greene s.n. [West Berkeley, May 1887] (W); Michener & Bioletti 123 (G). Amador Co.: Braunton 1263 (E). Marin Co.: Eastwood s.n. [Tiburon, July 26, 1900] (G). San Diego Co.: Edw. Palmer 310 (E, F), s.n. [Jamuel Valley, 26 June 1875] (G). San Luis Obispo Co.: Edw. Palmer 341 1/2 (F, G). San Mateo Co.: Elmer 4950 (E). CHANNEL ISLANDS: Santa Catalina: J. I. Carlson s.n. [Avalon, June 13, 1915] (E, G); Macbride & Payson 850 (G); Trask s.n. [Avalon, Sept. 1896] (E), s.n. [Avalon, May 1897] (F). MEXICO: Baja California: C. R. Orcutt 1301 (E); Wiggins & Gillespie 3977 (E). The Palmer 310 which she cites from "NY" is actually in the Barnard College herbarium and the 341 1/2 is in the Columbia University herbarium. The E. L. Greene s.n. which she cites from "US" is probable the E. L. Greene 78 cited by me hereinafter. She has annotated Braunton 99 in the United States National Herbarium as "atypical". She says "Verbena robusta has been much confused with the nearly related V. prostrata, but is quite readily distinguished from the latter by the brighter green color of the herbage, the scabrous upper surface of the leaves, and the usually dense spikes. Moreover, the mature calyx lacks the marked tendency toward subconnivent lobes, a characteristic of V. prostrata. The schizocarps of the two are very much alike. The collection Orcutt 1301 has a greatly elongated inflorescence and the leaves are not particularly scabrous. The specimens Braunton 99 and 1263 show unusually long floral bracts. These are probably atypical phases of the species or possibly hybrids." Another possibility is that they may represent V. lasiostachys var. scabrida Moldenke.

In all, 227 herbarium specimens, including the types or topotypes of all the names involved, have been examined by me.

Citations: CANADA: Nootka Island: Née 90 (Q). CALIFORNIA: Alameda Co.: M. S. Baker 10504 (Ca--804538); J. W. Blankinship s.n. [Berkeley, July 22, 1891] (Ca--397406); Brandt s.n. [Berkeley Hills, July 9, 1914] (Ca--176060), s.n. [Wildcat Canyon, July 16, 1914] (Ca); Chesnut s.n. [Oakland] (Ca--35053); Collector undesignated s.n. [Oakland] (Sg--16088); Eastman s.n. [near Livermore, Nov. 1898] (Ca--104873); E. L. Greene 78 (W--1323142); J. T. Howell 19838 (Gg--204484), 18173 (Gg--319113); Jepson 12935 (Ca); C. H. Michener s.n. [Temescal, Aug. 1891] (Ob--50821); Michener & Bioletti 1886 (Ca--35053), s.n. [Oakland, Aug. 1891] (Ur), s.n. [Leona, Aug. 6, 1892] (C, Ca--25157, Pl--22601, Pl--22603), s.n.

[Berkeley, Aug. 9, 1892] (Ur); Rattan s.n. [Shell Mound Park, June 1880] (Du—12891); H. A. Walker 696 (Ca—450180). Amador Co.: Braunton 1263 (N). Contra Costa Co.: Bowerman 371 (Ca—691729), 393 (Ca—691535), 464 (Ca—691756), 481 (Ca—691578); K. Brandegee s.n. [betw. Martinez & Port Costa, July 4, 1907] (Ca—139763); Ewan 9726 (Ca—723797, En, En, Rs—22314); J. T. Howell 1440 (Gg—172421); H. S. Yates 4069 [U. S. Dept. Agr. Forest Serv. 5601] (Ca—124419). Kern Co.: G. H. Horn s.n. [in Owens Valley and at Fort Tejon] (N); Twisselmann 1535 (Gg—391009). Los Angeles Co.: Blake 704 (Ur); Braunton 99 (W—465104); Epling & Epling s.n. [Mint Canyon, May 1925] (La); G. B. Grant 5305 (Du—75581), s.n. [June 17] (Du—75651); Knoche 879 (Du). Marin Co.: Eastwood s.n. [Tiburon, July 26, 1900] (Ca—104872); H. Edwards s.n. [Lagunitas Reservoir, 4/77] (N), s.n. [Saucilito, Apr. '77] (N); E. L. Greene s.n. [23 July 1891] (I); Jepson 21230 (Ca), s.n. [Triburon, July 20, 1891] (C). Mendocino Co.: Eastwood 9328 (Gg—31347), 10647 (Gg—31337). Merced Co.: Abrams 5295 (Du—67811). Monterey Co.: E. K. Abbott s.n. [Monterey, 1889] (Mn—23135, N), s.n. (Gg—313444); Belshaw 2731 (Ca—570390); Eastwood & Howell 5808 (Gg—256912, Se—49973); J. T. Howell 23360 (Gg—354231, S), 39595 (B), 40043 (Z), 40044 (B); L. S. Rose 35605 (N). Napa Co.: J. T. Howell 5599 (Gg—181600); Raven 3953 (Gg—386303). Orange Co.: Ewan 3612 (En), 7691 (En); F. R. Fosberg S.5146 (S). San Benito Co.: J. T. Howell 11527 (Du—219218, Gg—212584); Raven 8855 (Gg—408147); Rodda s.n. [Pinnacles, May 16, 1926] (Gg—140322). San Bernardino Co.: E. L. Greene s.n. [Highland Station, Aug. 7, 1887] (W—56191). San Diego Co.: Abrams 3787 (N); Cleveland s.n. [Sweetwater Valley, June 15, 1885] (N, W—2053934); Epling, Darsie, Knox, & Robison s.n. [Flin Springs, June 19, 1932] (Ca—520076, En, La); Gander 222 (Sd—11633), 251.3 (Sd—12197), A.226 (Ba); Edw. Palmer 310 (Bc, Pa); S. G. Stokes s.n. [Mesa, Aug. 1895] (Du—24210). San Francisco Co.: Goodspeed s.n. [1887] (Io—108903). San Joaquin Co.: Suksdorf 3 (Pl—138411). San Luis Obispo Co.: K. Brandegee s.n. [Lagoon] (Ca—185316); "I. J. C." s.n. [Nov. 22, 1907] (Ca—456151); R. J. Ferris 7656 (Du—206261); Edw. Palmer 341 (Pa), 341 1/2 (C, Pa, W—56223); Mrs. R. W. Summers s.n. (N); Wiggins 3618 (Du—278558, Se—60137); C. B. Wolf 3614 (N, Rs—18236). San Mateo Co.: W. R. Dudley s.n. [Oct. 24, 1897] (Du—278637, Du—278638); H. A. Dutton s.n. [Feb. 18, 1900] (Du—104441); Elmer 4950 (Ca—306773, Du—68489, Gg—31341, N, Or—15935, Pl—81730, Po—64686, W—665836); J. T. Howell 14745 (Gg—269702); L. H. Pammel s.n. [La Honda, Sept. 13, 1921] (Io—103251); L. W. Reinecke s.n. [Redwood City, June 13, 1937] (Ca—770046); Schreiber 307 (Ca—615560); Suksdorf 304 (Pl—138409). Santa Barbara Co.: Eastwood 868 (Gg—31368), s.n. [Zaca

Mt., June 17--22, 1902] (N); Morton 8698 (W--2179026); J. Torrey 416 (T); M. W. Williams 44 (Mn--35079). Santa Clara Co.: Abrams 1032 (Du--143857); J. B. Davy 278 (Ca--25163), 289 (Ca--25162); W. R. Dudley s.n. [Sept. 14, 1901] (Du--278636), s.n. [Oct. 10, 1908] (Du--24180); F. W. Johnson 524 (N); C. P. Smith 1155 (Mi); R. J. Smith 13 (Du--77583). Santa Cruz Co.: C. A. Reed s.n. [April 10, 1919] (Gg--31339). Siskiyou Co.: E. L. Greene 860 (Bc, Pa). Solano Co.: Jepson 20250 (Ca), s.n. [Alamo Creek, June 8, 1884] (Ca--25154). Sonoma Co.: J. B. Davy 865 (Ca--25159); E. Samuels 161 (Ky). Tuolumne Co.: R. Stinchfield 28 (Du--67519, N); Mrs. W. J. Williamson 189 (Du--100490, Gg--31345, Po--63841). County undetermined: Edw. Palmer 342 (C). Angel Island: E. Cannon s.n. [Angel Island, Marin Co., Aug. 11, 1893] (Gg--31363). CHANNEL ISLANDS: Santa Catalina: K. Brandegee s.n. [May 1916] (Ca--185415); J. I. Carlson s.n. [Avalon, April 28, 1914] (Gg--31369, W--880594), s.n. [Avalon, June 13, 1915] (Gg--31366, W--1070618); Dunkle 1955 (Hp, Po--155674); Eastwood 6500 (Gg--31367, W--1100481); F. R. Fosberg S.4606 (N), S.4741 (Ca--882793, N), S.4843 (Ca--625012, Ca--882792, I, N, S, W--1766310), S.5412 (Ca--625057, Ca--882794, En, I, N, Up, W--1766351); G. B. Grant s.n. [Avalon, Aug. 6, 1902] (Du--91161); Pourney s.n. [Sept. 17, 1894] (Ca--104871); Trask s.n. [Avalon, May 1897] (W--340303), s.n. [Avalon, Aug. 1901] (N); C. B. Wolf 3605 (Du--300754, Rs--3588), 3612 (Ca--729757, Du--300760, Rs--3595, W--1845569). Santa Cruz: Balls 11838 (S); T. S. Brandegee s.n. [1888] (Ca--169224); Clokey 5040 (Ca--882809, N), 5041 (Ca--535403, Ca--882796, Cm, Du--261238, En, Mi, Mn--23679, Mn--28445, N, Pl--110261, Po--201017, S, Ua--22838, Um--53, Um--58, Up, Ur, W--1601449); Collector undesignated 38-291/38-292 (Mi); F. H. Elmore 291 (Ak--11028); M. E. Jones s.n. [Valdez Bay, 9-5-27] (Po--172767, Ua--14843); Mrs. W. W. Rand 26 (Gg--179175); Swain s.n. [1919] (Gg--31348); Thatcher s.n. [May 1921] (Ca); M. W. Williams 15, in part (Gg--310872), 45 (Du--289568); C. B. Wolf 4160 (Ca--882808, Gg--381235, Rs--5594). MEXICO: Baja California: C. R. Orcutt 1301 (C, Ca--25167, W--1323121); Wiggins & Demaree 4741 (Du--215395, W--1588012); Wiggins & Gillespie 3977 (Du--196037, Gg--179399, Me, Me, Mi, N, Ob--50824, Po--193808, Rs--19050, W--1491295). CULTIVATED: Sweden: Herb. Mus. Bot. Stockholm s.n. [1843] (S).

VERBENA RUGOSA Mill., Gard. Dict., ed. 8, no. 18. 1768 [not V. rugosa D. Don, 1836, nor Michx., 1947, nor Muhl., 1809, nor Sweet, 1845].

Bibliography: P. Mill., Gard. Dict., ed. 8, no. 18. 1768; J. Sm. in Rees, Cycl. 36: no. 7. 1817; Steud., Nom. Bot., ed. 2, 2: 750. 1841; Walp., Repert. 4: 33. 1845; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Moldenke, Known Geogr. Distrib. Verbenac., [ed.

1], 19 & 102 (1942) and [ed. 2], 33 & 199. 1949; Moldenke, Résumé 40 & 473. 1959; Moldenke, Résumé Suppl. 7: 8. 1963.

Nothing is known to me about this plant except Miller's original description: "Verbena (rugosa) diandra, spicis ovatis, foliis subrotundis serratis & rugosis, caule fruticoso ramoso. Vervain with two stamina to the flowers, oval spikes, roundish, sawed, rough leaves, and a shrubby branching stalk. Sherardia arborescens nodiflora foliis serratis & rugosis flore purpureo, Houst. MSS. Tree-like Sherardia with a purple flower, and rough, sawed leaves....The eighteenth sort was discovered by the late Dr. Houstoun growing naturally at Campeachy, from whence he sent the seeds to England; this has a strong woody stalk, which rises ten or twelve feet high, covered with a light brown bark, and sends out many ligneous branches on every side, which are garnished with roundish, sawed, rough leaves, of a light green colour, standing upon short foot-stalks. The flowers are small, of a pale blue colour, and are collected into oval heads, standing upon naked foot-stalks which spring from the wings of the branches; these seldom appear in this country, and are not succeeded by seeds here; but the plants are easily propagated by cuttings during the summer months, and may be preserved many years in a moderate stove."

Walpers (1845) places it in his group of species at the end of the genus known by name only. Obviously, with only two stamens, it cannot be a true Verbena. I suspect that it will prove to be a Stachytarpheta. Schauer apparently does not list it either among his valid or excluded species. Smith (1817) seems to regard it as a synonym of V. simplex Lehm., which is not very probable.

VERBENA RUNYONI Moldenke, Phytologia 2: 25—26. 1941.

Synonymy: Verbena runyonii Moldenke apud Plant. Exsicc. Gray. 1274 (in sched.). 1942; Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947; Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951.

Bibliography: Moldenke, Phytologia 2: 25—26. 1941; Moldenke in Lundell, Fl. Texas 3 (1): 16 & 27. 1942; A. M. T. Davis, Study Boscaje Palma 62. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 13 & 102. 1942; Moldenke, Alph. List Cit. 1: 111, 125, 126, 200, 288, & 297. 1946; Moldenke, Phytologia 2: 166 (1946) and 2: 328. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 26. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 80. 1948; Moldenke, Wrightia 1: 225—227. 1948; Moldenke, Alph. List Cit. 2: 407, 453, 457, & 494—496 (1948), 3: 678, 681, 683, 806, 822, 873, 882, 883, & 939 (1949), and 4: 981, 989, 1060, 1184, 1213, 1218, & 1230. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 24, 27, 164, & 199. 1949; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 30, 32, 224, 373, & 474. 1959; Moldenke, Résumé Suppl. 7: 3. 1963; Moldenke, Phytologia 10: 179. 1964.

Tall, erect, coarse, annual or perennial herb, usually 18—24

inches tall; stems erect, green, rather stout, sharply tetragonal or square, hollow, larger below, sparsely hirsutulous with short whitish divergent hairs especially on the angles and at the nodes, glabrescent in age, more or less scabrellous on the angles; bark green or dark-green; roots fibrous; internodes elongate; leaves decussate-opposite, sessile, clasping, dark-green, oblong in outline, 2--6 cm. long, 0.8--3 cm. wide, more or less 3-parted or -lobed, each division pinnatifid-incised with broad acute teeth, abundantly hirsutulous on both surfaces with rather short whitish hairs which are bulbous-based on the upper surface and wear off there, leaving the upper surface scabrous on older leaves; inflorescence terminal, spicate, compound or clustered, the branches slender, erect, 14--25 cm. long, rather closely many-flowered, often bearing 1--3 pairs of much reduced leaves near the base, the flowers close together near the top of the spike, with a faint odor or odorless, very densely imbricate before and during anthesis, rather uniformly separated in fruit; peduncles (2--6 cm. long) and rachis slender, sharply tetragonal, rather densely or sparsely spreading-pilose or -pubescent, glandular, the pubescence very short; bractlets linear-lanceolate, about 3 mm. long, equaling the calyx, sharply attenuate, rather sparsely puberulent and glandular, the margins sparsely and irregularly ciliolate toward the base; calyx tubular, about 3 mm. long, glandular-pilose with short spreading hairs; corolla blue or light-blue to lavender, lavender-blue, violet, or purplish, about 6 mm. long, its tube puberulent at the apex on the outer surface, the limb about 4 mm. wide.

The type of this species was collected by Robert Runyon (no. 2485) -- in whose honor it is named -- in clay soil in open moist ground and ditches in the El Jardin Tract, at an altitude of 10 meters, Cameron County, Texas, on April 2, 1941, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species is closely related to V. xutha Lehm., which differs notably in its dense long-strigose or hirsute non-glandular pubescence throughout, especially on the bractlets and calyx, and which inhabits dry instead of uniformly moist ground. Runyon says about V. runyoni: "rare in this region: it occurs in moist ground, never in dry fields", "occasional: it occurs only in moist ground", "occasional in semi-dry fields", and "abundant in springtime". Hanson reports that it is "frequent in openings in woods", while F. B. Jones calls it "locally abundant" in Nueces County. Other collectors have found it in open or open moist ground, clay, clay-loam, or black, often heavy, soil, in ditches and roadside ditches, woods, chaparral, open places in jungles, open fields, and resaca bottoms, on banks and arroyo banks, prairies and coastal prairies, and along roadsides, at altitudes of 10 to 20 meters, flowering and fruiting from February to June and in August and October.

It is called "Rio Grande vervain" and was apparently introduced into cultivation in 1901. Suksdorf 2955 was collected at Portland, Oregon, presumably as a waif, on October 26, 1900 --

seeds were taken from it and planted in a garden at Bingen, Washington, and specimens collected there on August 10, 1901. Runyon describes the fruit as "a small capsule", but it is a schizocarp. L. I. Davis, in a letter to me dated March 25, 1942, refers to several color forms of this species which he states that he is thinking of naming and describing. Thus far I know of only one that has actually been published by him.

Material of this species has been misidentified and distributed in herbaria under the names V. halei Small, V. neomexicana (A. Gray) Small, V. neomexicana var. xylopoda Perry, V. officinalis L., V. xutha Lehm., and "Verbena hybrid". Ferris & Duncan 3160 was annotated by Perry as "aff. V. xutha". R. Runyon 2588 is accompanied by a photograph of the plant growing in situ.

In all, 105 herbarium specimens, including type material of all names involved, and 2 mounted photographs and clippings have been examined by me.

Citations: TEXAS: Aransas Co.: Cory 49034 (N). Brazoria Co.: Killip 42107 (W—2069798); Lundell & Lundell 11036 (N, Rf, Rf, W—1926940). Cameron Co.: J. F. Brenckle 47-350 (N); Clover 1519 (Mi), 1695 (Mi); Cory 28299 (N), 36467 (N, N), 51439 (Sm); Mrs. P. Cottrell 8743 (Au); L. Davis 35 (Au—122639, N); L. I. Davis s.n. [Southmost, May 1942] (Au, Gg—316103, N, Sm, W—1873783); Ferris & Duncan 3160 (Du—125423, Gg—31405, N); H. C. Hanson 496 (W—982847); M. C. Johnston 253-7 (Au—122641); C. L. Lundell 10679 (N, Rf), 10681 (Sm), 10709 (N, Rf, W—1926932); Lundell & Lundell 10012 (Ld, Mi, N), 10753 [Plant. Exsicc. Gray. 1274] (Al, Au, Au—197757, B, Bm, Ca—702525, Dp—31803, Du—350208, Gg—308963, Gu—23596, H—84531, Hi—53014, I, Ka—95213, Ld, Ld, Mi, Mi, Mi, Ms, N, N, Or—49870, Pl—131195, Rf, Rf, S, Sm, St—23303, Tl, Ur, Vi, W—1925784, We); A. R. Moldenke 190 (Fg, Z); Rose & Russell 24238 (W—1369527); R. Runyon 2485 (It—isotype, N—type, N—isotype, N—isotype), 2588 (N, N, N, N, N, N, N, N, N, N, N—photo), 2691 (N, N), 2692 (N, N), 3178 [Herb. Texas Agr. Exp. Sta. 43663] (Au), 4187 (Au, N, S); Sixth Grade Brownsville 34 (Au), s. n. [Nov. 1934] (Au); Tharp 1201 (Au, W—1116114). Nueces Co.: F. B. Jones 1925 (Ww), 6191 (Ww); F. W. Pennell 10340 (N). OREGON: Multnomah Co.: Suksdorf 2955 (Pl—138416). MEXICO: Nuevo León: R. F. Smith 476 (Au—218097). CULTIVATED: Washington: Suksdorf s.n. [garden, Bingen, Aug. 10, 1901; from Portland] (Pl—138362). MOUNTED CLIPPINGS: Moldenke, Phytologia 2: 25. 1941 (W).

VERBENA RUNYONI f. ROSIFLORA L. I. Davis in A. M. T. Davis, Study Boscaje Palma 62. 1942; L. I. Davis, Nature Leaflet [Lower Rio Grande Valley Nat. Club] 2: [4]. 1945.

Synonymy: Verbena runyonii f. rosiflora L. I. Davis ex Moldenke, Alph. List Invalid Names 26, in syn. 1947.

Bibliography: A. M. T. Davis, Study Boscaje Palma 62. 1942;

Moldenke, Known Geogr. Distrib. Verbenac. Suppl. 1: 2 & 4. 1943; L. I. Davis, Nature Leaflet [Lower Rio Grande Valley Nat. Club] 2: [4]. 1945; Moldenke, Alph. List Invalid Names Suppl. 1: 26. 1947; Moldenke, Wrightia 1: 226. 1948; Moldenke, Alph. List Cit. 4: 1218. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 24 & 199. 1949; Moldenke, Résumé 30, 373, & 474. 1959.

This form differs from the typical form of the species in having rose-colored corollas.

The type of the form was collected by L. Irby Davis at Southmost, Cameron County, Texas, in May, 1942, and is deposited in the herbarium of the University of Texas at Austin. It is known to me only from the type specimen and 2 mounted photographs.

Citations: TEXAS: Cameron Co.: L. I. Davis s.n. [Southmost, May 1942] (Au--type, N--photo of type, Z--photo of type).

VERBENA RUSSELLII Moldenke, Phytologia 2: 55--56. 1941.

Bibliography: Moldenke, Phytologia 2: 55--56. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 19 & 102. 1942; H. N. & A. L. Moldenke, Pl. Life 2: 80. 1948; Moldenke, Phytologia 3: 133. 1949; Moldenke, Alph. List Cit. 3: 873. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 33 & 199. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 14. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 40 & 474. 1959.

Annual herb, not at all nigrescent in drying; stems slender, sharply tetragonal, very minutely and obscurely puberulent throughout; nodes annulate; principal internodes 2--6.5 cm. long; leaves decussate-opposite, the uppermost ones sessile, the lower and older ones petiolate; petioles to 1 cm. long, winged, hirsute-pubescent; lower leaf-blades elliptic or ovate-elliptic in outline, 1--4 cm. long, 8--15 mm. wide, acute at the apex, irregularly incised-dentate along the margins, long-attenuate into the petiole at the base, rather densely hirsutulous and glandular on both surfaces, especially beneath, with stiff whitish hairs, the margins slightly revolute in age; midrib and secondaries flat or subimpressed above, prominent beneath; upper leaves linear-lanceolate, sessile, 5--15 mm. long, irregularly incised-dentate or entire, densely glandular-hirsutulous on both surfaces, with a very prominent midrib beneath; inflorescence terminal, spicate, paniculately branched, the branches to 20 cm. long, densely many-flowered; peduncles slender, sharply tetragonal, minutely puberulent, often elongate; rachis densely glandular-puberulent; bractlets lanceolate, 2--2.5 mm. long, attenuate to the sharply acute apex, densely glandular-pubescent and ciliate-margined; calyx tubular, about 2 mm. long, densely glandular-puberulent, its rim 5-apiculate; corolla small, hypocrateriform, its tube 3--3.5 mm. long, very slender, the limb 2--3 mm. wide during anthesis.

The type of this species was collected by Joseph Nelson Rose, Paul Carpenter Standley, and Paul George Russell (no. 14850) in a moist field in the vicinity of Culiacan, Sinaloa, Mexico, on April 21, 1910, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species is named in honor of Paul

George Russell and the type was annotated by Perry as "aff. V. officinalis L." in 1922. Gentry found the species in heavy olay soil of the coastal plain in Thorn Forest association at an altitude of 100 feet, calls it a "common annual", and records the popular name "alusame". It has been collected in flower and fruit in March and April.

In all, 6 herbarium specimens, including the type, have been examined by me.

Citations: MEXICO: Sinaloa: H. S. Gentry 7011 (Ak--21727, Du--356400, Mi, N); Rose, Standley, & Russell 14850 (N--type). Sonora-Chihuahua: H. S. Gentry 557m (Ak--20007).

xVERBENA RYDBERGII Moldenke, Revist. Sudam. Bot. 4: 19--20. 1937.

Synonymy: Verbena paniculato-stricta Engelm., Am. Journ. Sci. 46: 100. 1844. Verbena stricto-paniculata Engelm., Am. Journ. Sci. 46: 101. 1844. Verbena hastata x stricta Rydb., Bot. Surv. Nebr. 3: 18. 1894. Verbena paniculata x stricta Engelm. apud Rydb., Contrib. U. S. Nat. Herb. 3: 173. 1895. Verbena bracteosa x stricta Rydb., Fl. Rocky Mts. 740. 1917. Verbena hastate x stricta Patermann, Beitr. Zytol. Verbenac. 43. 1935. Verbena bracteosa x stricta Deam ex Moldenke, Revist. Sudam. Bot. 4: 20, in syn. 1937. Verbena bracteosa x stricta Eggert ex Moldenke, Revist. Sudam. Bot. 4: 20, in syn. 1937. Verbena stricta x hastata Eggert ex Moldenke, Revist. Sudam. Bot. 4: 20, in syn. 1937. Verbena hastata x stricta Gates, Fl. Kans. 190. 1940. Verbena stricta x hastata Hill ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena stricta x hastata Schneck ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena stricta x urticifolia Stevens (in part) ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947. Verbena stricto-hastata Patterson ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947. Verbena stricta x hastata Gates (in part) ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947. Verbena hastata x stricta Anderson ex Moldenke, Résumé 365, in syn. 1959. Verbena stricta x hastata Patterson ex Moldenke, Résumé 375, in syn. 1959. Verbena stricta x urticifolia Patterson ex Moldenke, Résumé 375, in syn. 1959. Verbena stricta x urticaefolia Eggert ex Moldenke, Résumé 375, in syn. 1959. Verbena stricta x urticifolia Glatfelter ex Moldenke, Résumé 375, in syn. 1959. Verbena urticaefolia x stricta Engelm. ex Moldenke, Résumé Suppl. 3: 41, in syn. 1962. Verbena rydbergi Moldenke, Résumé Suppl. 4: 18, in syn. 1962.

Bibliography: Engelm., Am. Journ. Sci. 46: 100--101. 1844; Rydb., Bot. Surv. Nebr. 3: 18. 1894; Rydb., Contrib. U. S. Nat. Herb. 3: 173. 1895; Rydb., Fl. Rocky Mts. 740. 1917; Kanda, Bot. Gaz. 69: 54--71, fig. 62, 73, & 74, pl. 6, fig. 4--6. 1920;

Schwenke, Zytol. Untersuch. Verbenac. 43. 1931; Rydb., Fl. Cent. N. Am. 678. 1932; Patermann, Beitr. Zytol. Verbenac. 19 & 43. 1935; Moldenke, Revist. Sudam. Bot. 4: 19—20. 1937; Gates, Fl. Kans. 190. 1940; Moldenke, Prelim. Alph. List Invalid Names 45—48. 1940; Moldenke. Suppl. List Invalid Names 10. 1941; Moldenke, Alph. List Invalid Names 45, 47, 49, & 50. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 6—9, 11, & 102. 1942; Deam, Kriebel, Yuncker, & Friesner, Proc. Ind. Acad. Sci. 54: 95. 1945; Moldenke, Castanea 10: 38. 1945; Moldenke, Bot. Gaz. 106: 159. 1945; Moldenke, Alph. List Cit. 1: 9, 109, 110, 121, 143, 149, 181, 193, 236, 256, & 267. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 24 & 27. 1947; Hill & Salisb., Ind. Kew. Suppl. 10: 242. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 80. 1948; Deam, Yuncker, & Friesner, Proc. Ind. Acad. Sci. 58: 95. 1948; Moldenke, Alph. List Cit. 2: 394—398, 400, 401, 438, 451, 452, 477, 513, 516, 517, 520, 524, 538, 547, 588, 594, 596, 605, 615, 620, & 644 (1948), 3: 774, 790—793, 800, 881, 887, 892, 900, 904, & 970 (1949), and 4: 996, 998, 1217, 1226, 1236, 1238, 1255, & 1261. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 12—15, 17, 18, 20, 21, & 199. 1949; Moldenke, Phytologia 3: 72 & 131 (1949), 3: 284 (1950), and 4: 67. 1952; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 126, 129, & 132. 1952; Moldenke, Phytologia 4: 185. 1953; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 2, 3: 126, 129, & 132. 1958; Moldenke, Am. Midl. Nat. 59: 359—361. 1958; Moldenke, Résumé 16—19, 21, 22, 25, 26, 359, 365, 366, 371, 375, & 474. 1959; Moldenke, Résumé Suppl. 2: 1 & 2. 1960; Moldenke, Phytologia 8: 121 & 146. 1961; Moldenke, Résumé Suppl. 3: 4—6 & 41 (1962), 4: 3, 18, & 21 (1962), and 5: 3. 1962; J. D. Poindexter, Trans. Kans. Acad. Sci. 65: 410, 411, 413, 415, & 417. 1962; Moldenke, Résumé Suppl. 7: 2. 1963; Gleason & Cronquist, Man. Vasc. Pl. 580. 1963; Steyerm., Fl. Mo. 1258 & 1260, map 1842. 1963; Moldenke, Phytologia 9: 53, 54, 206, 215, & 219—221 (1963), 9: 356 & 359 (1964), and 10: 109, 154, & 155. 1964; Moldenke, Résumé Suppl. 10: 1 (1964) and 11: 1, 2, & 8. 1964.

Illustrations: Kanda, Bot. Gaz. 69: 66, fig. 62, 67, fig. 73 & 74, & pl. 6, fig. 4—6. 1920; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 132 (1952) and print. 2, 3: 132. 1958.

This is the natural hybrid between V. hastata L. and V. stricta Vent. which occurs commonly where the ranges of these two species overlap in the central United States and southern Canada. It resembles V. hastata in habit, but its leaves are more reticulate-venose, densely velutinous beneath, the corolla is larger, the bractlets are ovate-lanceolate, about 4 mm. long, and not carinate, and the calyx is 4—5 mm. long. Fruit is produced sparingly. The corolla is said to vary from blue, lilac-blue, or purplish-blue to verbena blue, bright bluish-purple, heliotrope, or pink. The chromosome number is n = 7, based on Poindexter 191-29, 191-91, and 201-57, which are all typical of the hybrid and on which the pollen fertility was 21, 12, and 30 percent respectively. His 191-1 show-

ed 33 percent pollen fertility. Schwenke (1931) reports the haploid chromosome number for this hybrid as 6.

Poindexter (1962) compares this hybrid with its two parents as follows: Leaf index: V. stricta = 1.3—2.1 (average 1.8), xV. rydbergii = 1.7—3.5 (average 2.6), V. hastata = 3.2—5 (average 4.3); leaf-shape: V. stricta = elliptic to ovate, xV. rydbergii = broadly ovate to lanceolate, V. hastata = lanceolate; leaf-base: V. stricta = broadly attenuate to sessile, xV. rydbergii = broad to narrow attenuate, some hastately lobed, V. hastata = rounded & petiolate, hastately lobed; leaf-apex: V. stricta = acute to rounded, xV. rydbergii = gradually to abruptly acuminate, V. hastata = gradually acuminate; stem pubescence: V. stricta = hirsute, xV. rydbergii = long-strigose to hirsute, V. hastata = strigose; nutlet length: V. stricta = 2.2—2.9 (average 2.6), xV. rydbergii = 1.5—3 (average 2.5), V. hastata = 1.5—2 (average 1.7); markings on back of nutlets: V. stricta = deeply ribbed, xV. rydbergii = deeply ribbed to faintly ribbed or striate, V. hastata = smooth to faintly striate; pollen fertility: V. stricta = 50—100 percent (average 90 percent), xV. rydbergii = 3—92 percent (average 32.7 percent), V. hastata = 30—99 percent (average 79.8 percent); corolla-tube length: V. stricta = 4.5—5.5 (average 4.9), xV. rydbergii = 2.5—5.2 (average 4), V. hastata = 2—3.9 (average 3.5); calyx length: V. stricta = 3.8—5.1 (average 4.3), xV. rydbergii = 2.4—4.3 (average 3.2), V. hastata = 2.4—3 (average 2.7); petiole-lateral vein measurement: V. stricta = 3—6 (average 3.8), xV. rydbergii = 5—22 (average 9.7), V. hastata = 12—25 (average 17.6). His 229-8 showed 73.4 percent pollen fertility — some spikes are typical V. stricta, heavily fruited, but some are the typical hybrid with hardly any fruit, on the same stem; the lower leaves are hastate. His 229-19 had 88 percent pollen fertility and its inflorescence is almost typical V. stricta, but the leaves are hastate. G. E. Morley 805 and 1054-2 are the typical hybrid in all respects.

This hybrid has been found in waste or weedy ground, wet ground in streambeds, low marshy or wet land, low places in sand dunes, moist or sandy soil, sandy loam, broad ravines below ponds, moist ravines in limestone areas, waste places, sandy fields, pastures and overgrazed pastures, brushy overgrazed pastures, open woods, creek bottoms, and dry ponds, along roadsides or low grassy roadsides, creeks, and sloughs, at the junction of dry and moist bottoms, near low pasture draws, and on badly eroded or gravel hillsides, dry open or sand ridges, sandy slopes, and prairies, flowering from June to September, fruiting from July to September, to 740 feet altitude. Shimek encountered it on sandy slopes above skunk-cabbage (Symplocarpus foetidus) bogs; Ahles & Gilpin found it "frequent with both parents" in pastures; Ahles found it "in marshy area around pond, with V. hastata, V. stricta,

and V. urticifolia"; Goodman collected it growing with V. stricta and V. halei Small; Isely found it "scattered in pastures", while Lathrop saw it on "roadside bank bordering a prairie pasture with limestone surfacing in the pasture" and in a "waste place bordering a prairie park area, weedy ground." Wagenknecht found it on a weedy rocky southfacing bluestem prairie hillside, McGregor "scattered between parents in low moist areas in pasture" and "in ravine in prairie", while Horr found it "common in local colonies in wet alluvium of floodplain" in Kansas.

Miss Gaiser reports that "this form [her no. 1608PE] is quite abundant about this region and stretches over quite an area at Point Edward [Ontario] where the river front road passes [the] dump back of Metal Works, in sandy soil". For her 2232PE she reports "one plant with 10 tall stems, leaves near those of V. hastata; flowers heliotrope, pale in contrast to others", while for 1764PE she says "with narrower less rounded and more deeply cut leaves than 1759PE, flowers purplish-blue, on sandy ridge." Morley and McGregor describe its occurrence as "scattered".

E. W. Fell 57-736 is a mixture with V. hastata, while Demaree 29151 and L. H. Pammel s.n. [Hamilton, Sept. 8, 1918] & s.n. [Granite, Sept. 1, 1920] are mixtures with V. stricta -- indicating,again, the close proximity of at least one of the parent species.

The type of the hybrid, which is based on the V. paniculato-stricta of Engelmann, was collected by George Engelmann on the banks of the Mississippi River at Saint Louis, Missouri, in July, 1843, and is deposited in the Torrey Herbarium at the New York Botanical Garden. Verbena bracteosa x stricta Deam is based on a plant collected by Charles Clemon Deam (no. 20603) in Washington County, Indiana, and deposited in the herbarium of Purdue University; V. hastata x stricta Anderson is based on a collection made by Jacob Peter Anderson in Decatur County, Iowa, on August 25, 1904, and is deposited in the herbarium of Iowa State College; V. stricta x hastata Eggert is based on a collection made by Heinrich Karl Daniel Eggert in Saint Louis County, Missouri, on August 10, 1877, and is deposited in the herbarium of the Carnegie Museum; V. stricta x hastata Hill is based on a collection made by Ellsworth Jerome Hill (no. 160/1898) in waste ground at Eggleston, Chicago, Cook County, Illinois, on August 10, 1898, and is deposited in the herbarium of the University of Illinois; V. stricta x hastata Patterson and V. stricta x urticifolia Patterson are both based on a collection made by Harry Norton Patterson in the vicinity of Oquawka, Henderson County, Illinois, in "July", and is deposited in the herbarium of Iowa State College; V. stricta x hastata Schneck is based on a collection made by Jacob Schneck in moist soil beyond the Utter farm, Mount Carmel,Wabash County, Illinois, in June, 1908, and is deposited in the herbarium of the University of Illinois; V. stricta x urticaefolia Eg-

gert is based on an Eggert collection from Saint Louis, Missouri, made in August, 1875, and deposited in the herbarium of Iowa State College; V. stricta x urticifolia Glatfelter is based on a collection made by Noah Miller Glatfelter near Saint Louis, Missouri, on August 11, 1894, and is deposited in the herbarium of the University of Michigan; V. stricta x urticifolia Stevens (in part) is based on a collection made by George Walter Stevens (no. 2308, in part) in open woods near Miami, Ottawa County, Oklahoma, on May 26, 1913, and is deposited in the herbarium of the University of Oklahoma; V. stricto-hastata Patterson is based on a collection made by Patterson near Oquawka, Henderson County, Illinois, in August, 1873, and deposited in the United States National Herbarium; V. stricto-paniculata Engelmann is based on a collection made by Engelmann at Saint Louis, Missouri, in July, 1842, and is deposited in the Torrey Herbarium; and V. urticaefolia x stricta Engelm. is based on a collection made by Engelmann on the Ridge prairie, Vermilion County, Illinois, in August, 1860, and deposited in the Jesup Herbarium of Dartmouth College.

It is worth noting here that the V. bracteosa x stricta of Britton, of Clothier, of Palmer, and of Schnack are xV. perriana Moldenke; V. hastata x stricta of Allen is V. stricta f. albiflora Wadmond, of Elmore is V. hastata L., and of Ravenel is Stylodon carneus (Medic.) Moldenke; V. stricta x hastata of Allen is V. stricta Vent. and of Gates (in part) is V. stricta Vent. and xV. moechina Moldenke; V. stricta x urticaefolia of Gates, of Mackenzie, and of Pond are xV. illicita Moldenke, of Letterman and of Pammel are xV. moechina Moldenke; and V. stricta x urticifolia of Britton, of Bush, of Eggert, of Gates, and of Schneck are xV. illicita Moldenke, and of Stevens (in part) is xV. illicita and xV. perriana.

Numerous collectors have noted the possible hybrid nature of specimens and have commented on it. For instance, Hayden 3006 is labeled "Verbena hastata L. x V. stricta Vent.", while L. H. Pammel s.n. [Trempealeau, 7-20-82] bears the notation "a possible hybrid between V. hastata and V. stricta."

Material of this hybrid has been misidentified and distributed in herbaria under the names V. hastata L., V. hastata Michx., V. hastata stricta Rydb., V. hastata x urticifolia Eggert, xV. illicita Moldenke, V. officinalis L., V. stricta Vent., V. stricto-urticaefolia Engelm., and V. urticifolio-paniculata Engelm. On the other hand, the W. H. Horr E.33, distributed as "Verbena hastata x stricta", is actually typical V. stricta Vent., while the A. E. Allen s.n. [Talmage, July 11, 1891] and J. L. Sheldon s.n. [Peru, July 21, 1900], identified as "V. stricta x hastata", and the E. W. Lathrop 963, distributed as xV. rydbergii, are also typical V. stricta, and the S. V. Fraser 440, Loomis s.n. [Alton,

Oct. 1938], and Muck 82, cited in Gates, Fl. Kans., as "V. stricta x hastata", are also typical V. stricta. A. E. Allen s.n. [Peru, Aug. 2, 1893], distributed as "V. hastata x stricta", is actually V. stricta f. albiflora Wadmond.

The cytology of this hybrid is discussed by Kanda (1920), who reports that Dr. Chamberlain is authority for the statement that Hugo de Vries looked at specimens of this plant and stated definitely that they were not mutants, but were hybrids. He further states that albino forms occur, but I have seen albinos only of each parent, not as yet of the hybrid.

Gates (1940) records the hybrid from Cloud, Osborne, and Shawnee Counties, but I have not as yet seen material from those counties. He cites Clothier & Whitford s.n. [Elk Co., Aug. 20 & 21, 1897] and Kellerman s.n. [Galena, July 8, 1887] as V. stricta x hastata; Harman 40 as V. hastata x stricta; and J. B. S. Norton s.n. [Webber, Sept. 23, 1895] as V. hastata. xVerbena rydbergii has been recorded from Banner County, Nebraska, on the basis of a sheet of Rydberg 1564 in the Britton Herbarium which has a printed label reading "Banner County", but the longhand inscription says "near Mullen" (as on the other sheets of this number), which is in Hooker County. Apparently an incorrect printed label was used for this particular specimen.

In all, 193 herbarium specimens, including the type material of all the names involved, have been examined by me.

Citations: ONTARIO: Lambton Co.: Gaiser 1608PE (Gp, Gp, Mm), 1764PE (Gp, Gp, Gp, Mm); Gaiser & Montgomery 2232PE (Gp, Gp, Gp, Mm), 3233PE (Gp, Gp, Gp, Mm). ILLINOIS: Bureau Co.: Ahles 4176 (Ur); Winterringer 8008 (Il—37299). Champaign Co.: Ahles & Gilpin 8153 (Ur), 8154 (Hi—103235, Ur); G. N. Jones 12525 (Ur). Cook Co.: E. J. Hill 160/1898 (Ur, Ur, Ur); L. N. Johnson s.n. [Evanston, 9-3-89] (Ur—17462). DeKalb Co.: P. B. Whitford 156 (Il—33924). Fulton Co.: Winterringer 8864 (Il—38680). Hancock Co.: L. H. Pammel s.n. [Hamilton, Sept. 8, 1918] (Io—94058). Henderson Co.: H. N. Patterson s.n. [August 1872] (Al), s.n. [near Oquawka, August 1873] (W—1323127), s.n. [Oquawka, July] (Io—92216, Io—92217), s.n. [vicinity of Oquawka] (W—1323126, W—1323128, W—1323129, W—1416723). LaSalle Co.: Thone 87 (Ur). Macon Co.: A. R. Moldenke 819 (Lw, Ut, Z, Z, Z, Z, Z, Z). Peoria Co.: V. H. Chase 4586 (Ur). Pike Co.: J. Davis 3241 (Ur), s.n. [July 18, 1914] (Se—14934). Sangamon Co.: G. D. Fuller 6406 (Il-15794); J. C. McGregor 11174 (Il—15903). Vermilion Co.: Engelmann s.n. [Ridge prairie, Aug. 1860] (Dt); Storm s.n. [July 28, 1949] (Ur, Ur). Wabash Co.: Schneck s.n. [Mt. Carmel, Sep. 1, 1887] (Ur), s.n. [Mt. Carmel, June 1900] (Ur). Winnebago Co.: E. W. Fell 51324 (Il—38586), 51328 (Il—38587), 51329 (Il—38609), 51404 (Il—38332). County undetermined: F. Brendel s.n. [Illinois, 1873] (W—71993). INDIANA: Pulaski Co.: Friesner 22372

(N). Washington Co.: C. C. Deam 20603 (N, N, Pu). County undetermined: Drew s.n. [northwestern Indiana] (Ca--67759). IOWA: Adams Co.: Isely 5706 (Gg--392102). Cherokee Co.: L. H. Pammel s.n. [Cherokee, Oct. 17, '24] (Io--114907); Pammel & MacDonald s.n. [Goodell, July 12, 1922] (Io--105746). Clay Co.: A. Hayden 3003 (Io--149004), 3005 (Ca--999282, W--1835171), 3006 (Ca--999283, Io-149007, N, W--1835172). Dallas Co.: L. H. Pammel s.n. [Dawson, Aug. 16, 1918] (Io--95629). Decatur Co.: J. P. Anderson s.n. [Aug. 25, 1904] (Io--52107). Dickinson Co.: Shimek s.n. [Aug. 8, 1916] (N, Ur). Hancock Co.: L. H. Pammel s.n. [Garner, Jul. 27, 1918] (Io--96114). Hardin Co.: L. H. Pammel s.n. [Steamboat Rocks, 9-12-12] (Io--52669, Io--52670), s.n. [Eldora, Oct. 5, 1924] (Io--116221). Lyon Co.: L. H. Pammel s.n. [Granite, Sept. 1, 1920] (Io--97830). Madison Co.: A. R. Moldenke 942 (Lw, Ut, Z). Mahaska Co.: A. R. Moldenke 960 (Lw). Muscatine Co.: Shimek s.n. [Aug. 21, 1915] (N, Ur); Somes 3704 (W--672400). Palo Alto Co.: L. H. Pammel s.n. [Jul. 18, 1920] (Io--97793). Poweshiek Co.: Conard s.n. [8-29-1927] (Ok--10362); M. E. Jones s.n. [Grinnell, Aug. 1877] (Du--176622); A. R. Moldenke 966 (Lw). Story Co.: L. H. Pammel s.n. [Ames, 1902] (Io--81968). Warren Co.: A. R. Moldenke 951 (Lw). Winneshiek Co.: Tolstead s.n. [Decorah, July 23, 1934] (Io--144284). WISCONSIN: Grant Co.: A. R. Moldenke 997 (Lw); L. H. Pammel s.n. [Muscoda, Aug. 1928] (Io--137887). Rock Co.: E. W. Fell 57-736, in part (Ws), 57-740 (Ws); Skavlem s.n. [Janesville, July 23, '89] (Ws). Trempealeau Co.: Fassett & Wilson 9776 (Ws); L. H. Pammel s.n. [Trempealeau, 7-20-82] (Io--108154). MINNESOTA: Hennepin Co.: Sandberg 605 (Ka). KANSAS: Allen Co.: R. L. McGregor 13230 (Lw). Atchison Co.: A. S. Hitchcock s.n. [Atchison Co., Oct. 1896] (Ka). Barber Co.: Horr & Franklin s.n. [July 6, 1940] (Lw); R. L. McGregor 14598 (Lw); J. D. Poindexter 201-57 (Lw). Brown Co.: Clothier & Whitford s.n. [July 29, 1897] (Ka). Chautauqua Co.: W. H. Horr s.n. [July 6, 1930] (Lw). Cherokee Co.: Kellerman s.n. [Galena, July 8, 1887] (Ka). Cheyenne Co.: W. H. Horr 4691 (Lw). Comanche Co.: R. L. McGregor 14678 (Lw). Douglas Co.: J. D. Poindexter 191-1 (Lw), 191-29 (Lw), 191-91 (Lw), 229-8 (Lw), 229-19 (Lw). Elk Co.: Clothier & Whitford s.n. [Elk Co., Aug. 20 & 21, 1897] (Ka). Ellis Co.: E. Runyon 280 (Dm). Jackson Co.: B. L. Wagenknecht 3788 (Lw). Jefferson Co.: Harman 40 (Ka). Jewell Co.: J. B. S. Norton s.n. [Webber, Sept. 23, 1895] (Ka). Leavenworth Co.: W. H. Horr s.n. [6/14/30] (Lw). Marshall Co.: A. S. Hitchcock s.n. [Marshall Co., Dec. 10, 1896] (Ka). Montgomery Co.: R. L. McGregor 14395 (Lw). Nemaha Co.: A. S. Hitchcock s.n. [Nemaha Co., Dec. 11, 1896] (Ka). Pottawatomie Co.: Clothier s.n. [St. George, Aug. 28, 1896]

(Ka). Reno Co.: R. L. McGregor 12511 (Lw). Republic Co.: G. E. Morley 805 (Lw), 830 (Lw), 1054-2 (Lw). Scott Co.: V. L. Harms 1108 (Lw). Woodson Co.: E. W. Lathrop 963 (W--2235188), 1376 (N). County undetermined: Kleeberger s.n. (Gg--31419). MISSOURI: Holt Co.: Spellman S.311 (Lb--51524). Saint Louis Co.: Eggert s.n. [19 Aug. 1877] (Cm, I); Glatfelter s.n. [near St. Louis, 8-11-94] (Mi). Saint Louis: Eggert 5320 (N), s.n. [St. Louis, 4 Aug. 1875] (C, Go, Po--192591), s.n. [St. Louis, Aug. 1875] (Au, B, Ba, Ca--181598, Ca--425201, Cm, Du--202132, Gg--183217, Io--79869, Mn--6892, N, Po--192592, W--754955), s.n. [12 Aug. 1877] (Al); Engelmann s.n. [July 1939] (Br), s.n. [St. Louis, July 1842] (Pr, T), s.n. [banks of Mississippi, St. Louis, July 1843] (T--type), s.n. [St. Louis, Aug. 17, 1859] (Dt), s.n. [St. Louis] (S); Glatfelter s.n. [St. Louis, 6-3-92] (W--309643); Lejeune s.n. (Br). ARKANSAS: Benton Co.: Heacox s.n. [July 20, '89] (Ob--50804). Marion Co.: Demaree 29151, in part (Au--122726). NEBRASKA: Cedar Co.: F. E. Clements 2663 1/2 (C, W--71943). Hooker Co.: Rydberg 1564 (N, N, W--210369). Lancaster Co.: J. L. Sheldon s.n. [Lincoln, July 20, 1898] (We). Thomas Co.: Krautter s.n. [Halsey, July 23, 1907] (Up--45740, Up--45741, Up--45746, Up--45748). OKLAHOMA: G. W. Stevens 1791 (Ur, W--589685). Marshall Co.: G. J. Goodman 6488 (Ok, Z). Ottawa Co.: Schendel 202 (St--17571); G. W. Stevens 2308, in part (Du--66376, N, Ok--21028), A.2308 (St--9278). County undetermined: G. W. Stevens 4032a (Ok). LOCALITY OF COLLECTION UNDETERMINED: Engelmann s.n. (Dt); Short s.n. [banks of the Wabash] (Pr).

VERBENA SAGITTALIS Cham., Linnaea 7: 259. 1832.

Bibliography: Cham., Linnaea 7: 259. 1832; Steud., Nom. Bot., ed. 2, 2: 750. 1841; D. Dietr., Syn. Pl. 3: 603. 1843; Walp., Repert. 4: 18. 1845; Schau. in A. DC., Prodr. 11: 543. 1847; Schau. in Mart., Fl. Bras. 9: 190. 1851; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 147. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Briq., Arkiv Bot. Stockh. 2 (10): 13--14. 1904; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 39 & 102 (1942) and [ed. 2], 94 & 199. 1949; Moldenke, Phytologia 3: 454. 1951; Moldenke, Résumé 111 & 474. 1959; Moldenke, Résumé Suppl. 3: 41. 1962; Moldenke, Phytologia 9: 114. 1963.

Perennial herb, with creeping rootstocks; stems simple, 45--60 cm. tall, rush-like, tetragonal, with an aphyllous aspect, contracted at the nodes, the angles subalate, the margined edges and surfaces scabrous, the surfaces canaliculate, scrobiculate in lines, the depressions suborbicular, puberulent; internodes long-striate, marked with small pits or depressions between the striations; leaves small, sessile, less than 2.5 cm. long, ovate or triangular-oblong, acute at the apex, entire or subserrate along the margins, 3-nerved, strigose-scabrous; spikes cylindric, dense-flowered, subternately aggregate, becoming almost 2.5 cm.

long, thick; bractlets lanceolate, short, half as long as the calyx, acuminate at the apex, the margins hirtulous; calyx 5 mm. long, with elevated ridges, the angles hirtulous, the teeth subulate; corolla-tube scarcely longer than the calyx, the limb small; cocci about 2 mm. long, ferruginous on the back, slightly veiny and not striate-sulcate, margined, the commissure honey-colored, very slightly strigillose, leathery around the edges.

The type of this little-known species was collected by Friedrich Sellow in "Brasilia meridionali" and was deposited in the herbarium of the Botanisches Museum in Berlin, now destroyed. Unfortunately, it was never photographed, as far as I am aware, but was at one time studied by Dr. Briquet, who has given a brief description of it and vouches for the characters enumerated by Chamisso and by Schauer. Briquet (1904) compares it with and clearly differentiates it from V. ephedroides Cham., V. lindmanii Briq., and Junellia pseudo-juncea (C. Gay) Moldenke. Schauer (1851) points out that V. sagittalis is closely related to V. alata Sweet, but differs in its inflorescence, its bigger spikes and calyxes, in the character of the fruit, and most especially in the scrobiculate stems. Walpers (1845) classifies it in his Section Verbenaca, Subsection Inermes, and Group Junceae, with 7 other species. It has been collected in anthesis in March. Only 2 herbarium specimens have been examined by me.

Citations: BRAZIL: Rio Grande do Sul: Schwacke III.299 (Ja, N).

VERBENA SANTIAGUENSIS (Covas & Schnack) Moldenke, Phytologia 2: 150. 1946.

Synonymy: Glandularia santiaguensis Covas & Schnack, Revist. Argent. Agron. 11: 92--94, fig. 2. 1944. Verbena santiagensis Brücher ex Moldenke, Résumé Suppl. 7: 10, in syn. 1963.

Bibliography: Covas & Schnack, Revist. Argent. Agron. 11: 92--94 & 97, fig. 2. 1944; Covas & Schnack, Darwiniana 7: 86 & 88. 1945; Schnack & Covas, Darwiniana 7: 71, 73--75, & 77--79, fig. 2 & 5. 1945; Schnack & Covas, Revist. Argent. Agron. 12: 222, 224, & 228. 1945; Schnack & Gonzalez, Revist. Argent. Agron. 12: 285--288, fig. 1 & 2, pl. 15. 1945; Moldenke, Phytologia 2: 150 (1946) and 2: 348. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 10. 1947; Moldenke, Alph. List Cit. 3: 672 & 744. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 100, 107, 164, & 199. 1949; Moldenke, Revist. Sudam. Bot. 8: 169. 1950; Moldenke, Phytologia 3: 454 & 468. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 101 & 263. 1953; Moldenke, Phytologia 5: 133. 1955; Moldenke, Biol. Abstr. 30: 1093. 1956; Crovetto & Rojo, Revist. Invest. Agric. 11 (2): 129. 1957; Moldenke, Am. Midl. Nat. 59: 345, 356, 362, & 363. 1958; Moldenke, Résumé 120, 128, 224, 296, 420, 421, & 474. 1959; Moldenke, Résumé Suppl. 2: 13. 1960; Moldenke, Phytologia 8: 120, 121, & 123 (1961) and 8: 378 & 419. 1962; Moldenke, Résumé Suppl. 4: 18 (1962) and 7: 6 & 10. 1963; Moldenke, Phytologia 9: 45, 46, 131, & 199 (1963), 9: 400 (1964), 10: 133, 186, 295, & 301 (1964), and 11: 52. 1964.

Illustrations: Covas & Schnack, Revist. Argent. Agron. 11: 93, fig. 2. 1944; Schnack & Covas, Darwiniana 7: 78, fig 2A, pl. 1A & 5B. 1945; Schnack & Gonzalez, Revist. Argent. Agron. 12: 286, fig. 1A, D, E, & F, 287, fig. 2 A—E, & pl. 15, A. B. & D. 1945.

Perennial herb, sometimes erect; stems usually creeping, rooting at the lower nodes, ascending toward the apex, cylindric-quadrangular, pubescent, the hairs simple, rather rigid, 0.5 mm. long, oblique, retrorse; leaves decussate-opposite; petioles long, 0.5—1.7 cm. long; leaf-blades pinnatisect, ovate-triangular in outline, 2—5.5 cm. long, 1.3—3.5 cm. wide, pubescent above with simple subappressed hairs, pubescent on the margins and venation beneath with simple oblique hairs, the lobules acute to subobtuse at the apex, subrevolute along the margins; inflorescence terminal, spicate, solitary, abbreviated during anthesis but sometimes elongating after anthesis; bractlets lanceolate, more than half the length of the calyx, ciliate along the margins, with subappressed hairs on the back; calyx tubular, 6—7 mm. long, pubescent with simple oblique hairs, rarely with subsessile glands on the angles; corolla hypocrateriform, pale-lilac or purple, laxly pubescent at the apex of the tube outside as well as on the lower surface of the upper lobes and at the base of the lower lobes, the lobes all glabrous on the upper surface; stamens typical, the 2 upper ones with subcylindric glandular appendages, the thecae large and exserted; pistil typical; style 6.5 mm. long; ovary 1 mm. long; cocci subcylindric, 2 mm. long, rounded at the apex, truncate at the base, reticulate at the middle on the upper surface of the back; chromosome number: 2n = 10.

The species is based on a specimen collected by Benno Julio Christian Schnack (no. 2111) from material cultivated at Capital, Mendoza, Argentina, on April 1, 1944, grown from seed originally collected from plants growing along the highway between Santiago del Estero and Catamarca, in the province of Santiago del Estero, Argentina. Covas & Schnack (1944) note that "El polen de esta especie presenta un grado relativamente elevado de esterilidad (alrededor del 50% de polen es estéril), según las observaciones efectuadas en el ejemplar tipo." They assert that its relationships are with V. dissecta Willd. and V. laciniata (L.) Briq. They distinguish it from its immediate relatives as follows:

1. Stems erect or suberect, not rooting.
   2. Entire plant covered with a dense pubescence of simple hairs mixed with glandular ones; leaves triparted-pinnatilobed.. .....V. perakii.
   2a. Entire plant covered with a sparse pubescence of only simple hairs; leaves pinnatisect.....V. mendocina.
1a. Stems creeping, rooting at the base, ascending at the tips.
   3. Cocci 2 mm. long.
      4. Bractlets one-third as long as the calyx; spikes not elongating after anthesis.....V. dissecta.
      4a. Bractlets more than half the length of the calyx; spikes elongating after anthesis.....V. santiaguensis.
   3a. Cocci more than 3 mm. long.

5. Corolla externally glabrous; glandular appendages of the connectives subcylindric, hardly visible from outside or included; pubescence formed of appressed hairs..... .....V. laciniata.

5a. Corolla externally pubescent; glandular appendages of the connectives much compressed, exserted; pubescence formed of erect oblique hairs.....V. parodii.

Crovetto & Rojo (1957) describe the plant as "Planta perenne con tallos rastreros, radicantes, vellosos; hojas opuestas, pinatisectas, pilosas; flores pequeñas, blanco-lilacinas, reunidas en espigas primero globosas y luego alargadas. Especie autóctona de floración primaveral y estival; que hemos tenido ocasión de observar invadiendo algunos almácigos y cultivos realizados sobre suelos humíferos y fértiles. También hemos visto un cultivo de cebolla en Chicoana [Salta] totalmente invadido por esta especie." Covas & Schnack (1945) give figures relative to the length of the pistil as compared to the size of the pollen-grains in this species. The only common name recorded for it is "verbena". It has been collected in anthesis in April, July, August, and December. Material has been misidentified and distributed in herbaria under the name V. erinoides L. On the other hand, the Brücher & Brücher s.n. [Rio Pisaril, 30/1/49], distributed as this, is in part V. cheitmaniana Moldenke and in part V. tenera Spreng.

Verbena santiaguensis was introduced into cultivation in 1943. It is very similar to V. tenuisecta Briq., but differs in having its leaf-segments broader, oblong, not uniform in width, mostly 1 mm. or more wide, the corolla-tube less than 1 cm. long, its limb only about 3 mm. wide, and the spikes being densely congested and not elongating even after anthesis according to my observation (this differs from the original description).

In regard to the Lorentz collection cited below from "Concepción", Herter says that "Concepción del Uruguay" is in Argentina, although most of the plants found there occur also in Uruguay.

In all, 5 herbarium specimens have been examined by me.

Citations: URUGUAY: Lorentz s.n. [Concepción, 7.1877] (S). ARGENTINA: Corrientes: A. T. Hunziker 5528 (N). La Rioja: F. A. Barkley 19Ar694 (N). CULTIVATED: New York: H. N. Moldenke 18604 (N, N).

VERBENA SCABRA Vahl, Eclog. Am. 2: 2. 1798 [not V. scabra Marnock, 1840, nor Muhl., 1825].

Synonymy: Verbena polystachia H.B.K. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena urticifolia Jepson, Fl. Calif. 3 (2): 380, in syn. 1943 [not V. urticifolia L., 1753, nor Gray & Small, 1962]. Verbena polystachya Jepson, Fl. Calif. 3 (2): 380, in syn. 1943 [not V. polystachya H.B.K., 1818]. Verbena polystachys H.B.K. ex Moldenke, Alph. List Invalid Names Suppl. 1: 26, in syn. 1947. Verbena urticaefolia Griseb. ex Alain in León & Alain, Fl. Cuba 4: 281, in syn. 1957 [not V. urticaefolia L.,

1811]. Ocymum nervosum Vahl ex Moldenke, Résumé 322, in syn. 1959. Verbena scabra Gray ex Moldenke, Résumé 374, in syn. 1959. Verbena urticifolia Griseb. ex Moldenke, Résumé 377, in syn. 1959. Berbena scabra Vahl ex Moldenke, Résumé Suppl. 7: 7, in syn. 1963.

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73. 1949; Fernald in A. Gray, Man. Bot., ed. 8, 1209, 1210, & 1612, fig. 1462. 1950; Thorne, Castanea 16: 43. 1951; Moldenke, Phytologia 3: 450 (1951) and 4: 66. 1952; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 126—129. 1952; Moldenke, Phytologia 4: 166. 1953; Thorne, Am. Midl. Nat. 52: 313. 1954; Moldenke, Inform. Mold. Set 48 Spec. [4]. 1954; Cooley, Rhodora 55: 288. 1955; Moldenke, Inform. Mold. Set 51 Spec. 4. 1956; Alain in León & Alain, Fl. Cuba 4: 281, fig. 121A. 1957; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 2, 3: 126—129. 1958; Moldenke, Résumé 9—13, 15, 22, 23, 30, 32, 33, 40, 49, 53—55, 57, 59, 322, 372, 374, 377, & 474. 1959; Moldenke, Résumé Suppl. 1: 2 & 4 (1959) and 2: 13. 1960; Moldenke, Phytologia 8: 143. 1961; Moldenke, Résumé Suppl. 3: 3, 6, 7, & 9 (1962), 4: 1—3 (1962), 5: 1 & 2 (1962), 6: 1 & 3 (1963), and 7: 1 & 10. 1963; Gleason & Cronquist, Man. Vasc. Pl. 579 & 580. 1963; Moldenke, Phytologia 8: 483, 487—489, & 491 (1963), 9: 52, 78, 93, 165, & 199 (1963), and 10: 140, 141, & 285. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1239. 1964.

Illustrations: Marnock, Floricult. Mag. 5: pl. 54 [in color]. 1840; N. L. Britton, Fl. Bermuda 310. 1918; Fernald in A. Gray, Man. Bot., ed. 8, fig. 1462. 1950; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 128. 1952; Alain in León & Alain, Fl. Cuba 4: fig. 121A. 1957; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 2, 3: 128. 1958.

Annual or perennial herbs, sometimes shrubby, to 2 m. tall, stoloniferous, branching at the upper half or third; roots fibrous; stems solitary, erect, simple or branched, hispidulous; leaves thick, 2 or 3 at a node, usually decussate-opposite, ovate to elongate-ovate, 3—13 cm. long, 2.5—5 cm. wide, petiolate, acute or obtusish at the apex, serrate-dentate along the margins, very scabrous or harsh-scabrous and commonly strigillose above, less scabrous and somewhat paler beneath and also hispidulous along the veins; spikes paniculately disposed, slender, pedunculate, copiously and closely flowered and fruited; bractlets ovate-acuminate, about half as long as the calyx, hispidulous; calyx to 2 mm. long; corolla hypocrateriform, varying from blue, bluish, or pale-blue to light-purple, purple, purplish-white, lavender, violet, lilac, pale-rosy, rosy, pink, pinkish, or even white, its tube scarcely, if at all, longer than the calyx, usually violet with white hairs in the throat, the limb 2—3 mm. wide, the lobes usually light lavender-pink, obtuse at the apex; anthers yellow, glandless; stigmatic surface of the pistil midway between 2 almost equal obtusish sterile lobes; fruiting-calyx 2.5—3 mm. long, ovoid, hispidulous, with the somewhat unequal lobes acutely connivent, diverging from the rachis of the spike by an angle of 45° or more; cocci ellipsoid, trigonous, 1—1.5 mm. long, faintly striate, reticulate above, longitudinally 2-striate on the back, the striae tending to disappear into reticulations, the commissural faces extending to the tip of the schizocarp, meeting sharply at right angles, muriculate and white-puberulent.

The type of this distinct species was collected by Julius Philipp Benjamin von Rohr (no. 35) somewhere "in America meridi-

onali", and is deposited in the herbarium of the Universitetets Botaniske Museum at Copenhagen. This rather widespread and distinctive species inhabits meadows, marshes and brackish marshes, swamps, pinelands, and maritime forests. It has been found in damp or marshy land, low moist or marshy ground, open swamp land, open or wet ground, cultivated ground, moist or moist sandy ground, moist rich soil, and rich sandy muck, in moist or wet sandy ditches, old fields, damp meadows, open sandy bogs, dry sandy lowlands, low pinelands, canyons, thickets, and moist ground at the edge of marshes, on river- and streambanks, open moist streambanks, sandbanks and canalbanks, lake shores and river bottoms, sandy beaches and the margins of rivers, about salt lagoons, along roadsides, creeks, and rivers, at the edge of hammocks, the inner border of brackish to fresh marshes, the borders or marshes and low woods, the edge of waterholes, and at highwater-mark on shores. Collectors report it from marshy areas, low marshy ground in open sun, brown marshy swamps, low or sandy woods, wet pine-barrens, damp soil near springs, salt marshes, grassy soil, lagoons, depressions among dunes and low areas in open forests back of dunes, among rocks, in hotel yards and low pigpens, in true shale barrens, pine woods, brush near creeks, and in low places or swampy country in general, at altitudes of 5 to 7800 feet, flowering and fruiting from February to December.

In Texas it grows in mostly rich soil of low ground, marshes, and swamps, and along the edges of streams and lakes, blooming from March to December, in the eastern and central parts of the state, from Newton and Jefferson Counties west to Uvalde and Reeves Counties. Head describes it as "scarce" in Jeff Davis County.

In California it is said to inhabit the Upper Sonoran Life Zone according to C. B. Wolf, while Johnston regards it as "introduced" In Louisiana it is said by Lemaire to be "uncommon with Quercus and Stenotaphrum" on the banks of lagoons. On Sapelo Island, Georgia, Duncan found it "in [the] open at side of roadway around freshwater lake fed by artesian springs". In Palm Beach County, Florida, it is described by Baker as "common everywhere in this part of the glades" and as "everywhere" by O'Neill; in Collier County it is "common in the everglades", according to O'Neill. Rankin reports it "common in fields" in Bermuda, Ekman says "common in swamps" in the Dominican Republic, and Wright says "introduced on roadsides" in Las Villas, Cuba. Webster & Proctor found it to be "common in the drier areas" of Jamaica.

Warnock reports the plant as "sparse" in Texas, while in Wakulla County, Florida, it is said by Redfearn & Kral to be "frequent in sandy peat in area recently drained and burned". Murrill (1945) describes it as having small, pink or white flowers, and growing in low ground, while Thorne (1954) reports it as "rare" in moist woods and swampy places. W. H. Hodge (1946) claims that V. polystachya is a cushion plant on the puna of the Peruvian Andes — a statement which is ridiculous, since neither V. carolina L nor V. scabra Vahl (both of which species have a "V. polystachya"

in their synonymy) grows in Peru nor ever forms a cushion plant!

H. M. Pollard says for his collection of V. scabra from north of Veronica Springs, Santa Barbara County, California, made on August 8, 1957: "So far as I can learn, never before reported from Santa Barbara — this from a favored collecting spot probably visited off and on for the past 100 years. When did the plant arrive?"

The Lindheimer 1077 collection cited below may be from either Comal or Comanche County, Texas, since its label merely states: "Comanche Spring: New Braunfels, etc." It was cited in Lundell, Fl. Texas 3 (1): 23 (1942) from Bexar County in error. Dr. S. W. Geiser believes that the Bigelow s.n. cited by Perry from Texas was not collected on the present Leon River as indicated on the label, but along the present Leona River in either Frio, Uvalde, or Zavalla County.

In Shreve & Wiggins (1964) it is stated that V. scabra grows "In mostly rich soil of low ground of marshes and swamps, and along the edges of streams and lakes, Lower Sonoran to Tropical Zones, from North Carolina to Florida and the Greater Antilles, west to southern California and south to Baja California, Coahuila, and Nuevo León."

Walpers (1845) classifies this species in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Micranthae, and Secondary Subgroup Holophyllae, along with 22 other species. Schauer (1847) places it doubtfully in synonymy under V. urticifolia L. It should be noted here that the V. scabra of Marnock is actually V. rigida Spreng., while that of Muhlenberg is Phyla lanceolata (Michx.) Greene. Bailey (1935) reports that the seeds of V. scabra are handled by Kew. Thorne (1951) reports the species from Dougherty and Lee Counties, Georgia, but I've not as yet seen substantiating specimens. Bogusch 1235 is a mixture with V. xutha Lehm., while Fernald & Long 12453 is a mixture with xV. engelmannii Moldenke, The C. C. Deam 65942 collection shows fasciation, while Ekman 933 has one spike fasciated-flattened for 4 inches. One of the Cory 38068 sheets in the University of Texas herbarium is inscribed "H. N. Moldenke 38068" in error. Rugel 639 in the United States National Herbarium has an original label inscribed "Ad fluv. St. Johns", to which someone has added "Ins. Cuba", obviously in error, since the Saint Johns River is in Florida. The Sapelo Island cited below is politically in McIntosh County, Georgia. Braunton says "I found what is evidently polystachya x prostrata but it is not settled. Parish has it from me under No. 520 and it is also at Washington, D.C."

Small (1903 & 1913) uses the name V. polystachya H.B.K. for V. scabra, but this name is a synonym of V. carolina L. Common names reported for V. scabra are "rough vervain", "verbena cimarrona", and "white vervain". White-flowered specimens (perhaps worthy of a form name?) are Ahles & Leisner 32007, H. A. Allard

8270, W. Harris 9937, and Radford 28495.

Material of V. scabra has been misidentified and distributed in herbaria under the names V. carolina L., V. carolinensis Michx., V. caroliniana L., V. halei Small, V. hastata L., V. littoralis H.B.K., V. officinalis L., V. polystacha H.B.K., V. polystachya H.B.K., V. polystachys H.B.K., V. urticaefolia L., V. urticifolia L., V. urticifolia x hastata Gates, and Priva echinata A. L. Juss.

On the other hand, the Kearney & Peebles 10506, distributed as V. scabra, is V. carolina L.; Raven, Lewis, & Thompson 12180 is V. menthaefolia Benth.; and Ahles & Duke 48221 is V. urticifolia var. leiocarpa Perry & Fernald; Wiggins 9157 is V. orcuttiana Perry; T. S. Brandegee s.n. [Cañon Salado, June 1, 1897] and Edw. Palmer 153, distributed as V. polystachya, are V. menthaefolia Benth.; Ewan 17704 and I. L. Forbes s.n. [Colfax, VIII-20-27] are V. xutha Lehm.; and F. S. Blanton 6671 and O'Neill 6200 & s.n. [1 1/2 miles south of Leesburg, Sept. 26, 1929] are Hyptis mutabilis (A. Rich.) Briq. in the Lamiaceae.

Fernald, in Rhodora 38: 442--443 (1936), says that in V. scabra "the stigmatic surface lies between two almost equal sterile lobes....the fruiting calyx is strongly divergent and the nutlets reticulate above". He cites Fernald & Long 6863 from Surry County, Virginia, deposited in the Gray Herbarium.

Perry (1933) cites the following 65 additional specimens not as yet seen by me: NORTH CAROLINA: New Hanover Co.: Randolph & Randolph 1012 (G). FLORIDA: Broward Co.: Small & Carter 1072 (F). Collier Co.: O'Neill s.n. [Everglades, 27 Aug. 1925] (E). Columbia Co.: Quaintance s.n. [Lake City, 21 July 1893] (E). Dade Co.: Edw. Palmer 397 (E, G). Duval Co.: Curtiss 5111 (E). Franklin Co.: A. W. Chapman s.n. [Streets of Apa.] (E). Hernando Co.: A. S. Hitchcock s.n. [June--July 1898] (E). Lake Co.: G. V. Nash 1248 (E, G). Lee Co.: A. S. Hitchcock 269 (E). Manatee Co.: S. M. Tracy 6652 (E, G). Okeechobee Co.: E. J. Palmer 27462 (E). Orange Co.: Fredholm 5416 (E, G). Saint Johns Co.: Rugel 156 (E, F). MISSISSIPPI: Jackson Co.: C. L. Pollard 1191 (E, G); Skehan s.n. [Ocean Springs, 13 Aug. 1895] (E). LOUISIANA: Orleans Par.: Joor s.n. [New Orleans, 21 Oct. 1885] (E); Riddell s.n. [New Orleans] (G). Plaquemines Par.: Tracy & Lloyd 22 (E, G). TEXAS: Comal Co.: Lindheimer 618 (E), 1077 (E, G), s.n. [New Braunfels, 1847] (E). Harris Co.: Lindheimer s.n. [Houston, July 1842] (E). Jefferson Co.: E. J. Palmer 10692 (E). County undetermined: Bigelow s.n. [Leon River, Oct. 1850] (G). ARIZONA: Pima Co.: Pringle s.n. [Santa Cruz River, Tucson, 11 May 1881] (G), s.n. [banks of the Santa Cruz River near Tucson, 18 July 1884] (D, F, G). CALIFORNIA: Los Angeles Co.: A. Davidson s.n. [Los Angeles,

1892] (G); Lyon 6 (G). San Bernardino Co.: S. B. Parish s.n. [San Bernardino, Oct. 1891] (E); Parish & Parish 1043 (E, F), 11143 (G). County undetermined: Wallace s.n. (G). MEXICO: Baja California: C. R. Orcutt 1302 (E). Coahuila: Edw. Palmer 1040 (D, G). BERMUDA ISLANDS: Main: Brown & Britton 373 (D, G), 1631 (D); F. S. Collins 268 (G); A. H. Moore 2874 (G). Smith: A. H. Moore 2947 (G). CUBA: Las Villas: Combs 389 (E, G). Province undetermined: C. Wright 3659 (G). JAMAICA: W. Harris 11808 (E, G); A. S. Hitchcock s.n. [Port Antonio, Dec. 1890] (E); Lang 102 (D). HISPANIOLA: Haiti: Eyerdam 201 (G), 432 (G). PUERTO RICO: Read s.n. (D); Sintenis 1074 (E), 2010 (D). The collection which she cites as "Randolph 1012" is cited by me below as Randolph & Randolph 1012, while her "Leon & Edmunds 8719" is León & Edmund 8719. The Curtiss s.n., Keeler s.n., and Pollard 1191, which she cites from "NY", are all actually in the Columbia University herbarium, while the Pringle s.n. [banks of the Santa Cruz River near Tucson, July 18, 1884] which she also cites from "NY" is in the Barnard College Herbarium. She comments: "Verbena scabra, often confused with V. urticifolia, is easily separable by the very scabrous upper surface of the leaf and the rather conspicuous divergence of the fruit from the rachis of the spike. A quite distinctive feature is the position of the stigmatic surface apparently between two almost equal sterile style-lobes. This condition is somewhat approached in V. carolina, but in the other species examined the second sterile lobe has never been so definitely developed." She cites Fuertes 391 & 1758 from Haiti, but they were actually gathered in the Dominican Republic. The "Krig 3187" which she cites is an error for Roig 3187.

In all, 464 herbarium specimens and 2 mounted photographs, including type material or phototypes of all the names involved, have been examined.

Citations: VIRGINIA: Isle of Wight Co.: Fernald & Long 12785 (Au, St, Vi). Princess Anne Co.: Fernald & Long 10799 (H--684441, N, W--1810833), 12453, in part (Gu--27186). Shenandoah Co.: H. A. Allard 8270 (W--1829979). Surry Co.: Fernald & Long 6863 (N, Up, W--1682886). NORTH CAROLINA: Bladen Co.: Ahles & Duke 50975 (Hi--110657); Ahles & Leisner 33335 (Hi--104441). Brunswick Co.: Godfrey, Fox, & Beaman 50046 (No--26200). Carteret Co.: R. K. Godfrey 49809 (N); R. Gray s.n. [7/18/38] (H--50217); Lewis 229 (N). Chowan Co.: Ahles & Duke 47840 (Hi--104439); A. R. Moldenke 468 (Fg). Hyde Co.: A. C. Mathews s.n. [summer 1931] (Hi--13321). New Hanover Co.: Randolph & Randolph 1012 (Ba). Onslow Co.: Ahles & Leisner 32582 (Hi--104436). Pender Co.: Ahles & Leisner 32380 (Hi--104435). Perquimans Co.: A. R. Moldenke 466 (Fg). SOUTH CAROLINA: Beaufort Co.: Ahles & Bell 15630 (Hi--92865, Hi--92866), 18011 (Hi--92867). Charleston Co.: Ahles & Leisner 32094

(Hi—104440). Colleton Co.: C. R. Bell 4675 (Hi—92868). Dorchester Co.: Ahles & Leisner 32007 (Hi—104437). Georgetown Co.: Godfrey & Tryon 277 (Ca—956876, Gg—290714, N, W—1837183); Radford 28495 (Hi—92725), 31332 (Hi—92727). Horry Co.: Duke 49 (Hi—92726). Jasper Co.: E. O. Mellinger s.n. [May 22, 1959] (Hi—146718); Mrs. E. O. Mellinger 338 (Hi—134657). Saint Helena Island: Cuthbert s.n. [Oct. 1903] (Fl—21119). Sea Island: Cuthbert s.n. [Aug. 1884] (Fl—21136). Sullivan's Island: Biltmore Herb. 14892 (S). GEORGIA: Dapelo Island: W. H. Duncan 20258 (Lb—42772), 20268 (Au—167515, Gg—413460, Hi—106316, W—2262575). FLORIDA: Alachua Co.: Arnold & West s.n. [Gainesville, 17 Sept. 1937] (Fl—27112); Cuthbert s.n. (Fl—21134, Fl—21135); Hume, Arnold, & West s.n. [Gainesville, 3 July 1937] (Fl—27229). Brevard Co.: H. N. Moldenke 21503 (Hk, Ok, Sm, Ss, Z); W. H. Rhoades s.n. [Merrit, 4/2/28] (Fl—11930). Broward Co.: H. N. Moldenke 591 (E, Go, H—5477, N, S, Up, Ur), 599a (E, Go, N, S, Up, Ur); Small & Carter 1072 (N). Clay Co.: J. N. McFarlin 7898 (N). Collier Co.: Buswell s.n. [April 10, 1936] (Bu); C. C. Deam 65573 (Dm), 65856 (Es, N), 65942 (Mk, N), 66041 (Es, N); J. B. McFarlin 4650 (Mi); O'Neill s.n. [Everglades, 27 Aug. 1925] (Io—127944, Po—217260). Columbia Co.: Quaintance 209 (Fl—21131, Ga). Dade Co.: C. C. Deam 60864 (N); A. A. Eaton 496 (Rf); Elder 464 (H—69375); O'Neill s.n. [March 14, 1933] (I); Edw. Palmer s.n. [Biscayne Bay, 1874] (W—71951); J. K. Small 4020 (N, S), 8090 (S); Small & Small 4520 (N). DeSoto Co.: J. K. Small 8186 (N). Duval Co.: Curtiss 5111 (C, W—224492); Keeler s.n. [vicinity of Mayport and Jacksonville] (C); Lighthipe 406 (N); Rugel 639 (W—264614). Escambia Co.: C. T. Mohr s.n. [Pensacola, July 5, 1872] (W—771853). Flagler Co.: West & Arnold s.n. [Andalusia, 10/10/40] (Fl—32843). Franklin Co.: R. M. Harper 242 (N, W—1039060). Highlands Co.: Brass 15556 (W—2065618). Lake Co.: G. V. Nash 1248 (C, Ca—104867, Es, Mi, Mm—15401, S, W—228276), 1607 (Es). Lee Co.: Buswell s.n. [June 24, 1933] (Bu); C. C. Deam 65658 (Dm, Es, N); A. S. Hitchcock 269 (N, W—387303), s.n. [Myers, July—Aug. 1900] (Ka); H. N. Moldenke 972 (B, E, Go, H—5478, N, Ob, S, Up, Ur, W—1184413); J. P. Standley 427 (W—910802). Leon Co.: Berg s.n. [near Tallahassee] (N). Levy Co.: R. Kral 7803 (N); Watson & Murrill s.n. [Gulf Hammock, 6/18/39] (Fl—31455). Manatee Co.: S. M. Tracy 6652 (N, N). Monroe Co.: Meebold 27567 (Bi). Nassau Co.: Biltmore Herb. 1112c (Po—267670); P. O. Schallert 14103 (Hi—146050). Okeechobee Co.: Harshberger s.n. [Okeechobee, June 22, 1912] (Up—62867); Small & Small 4341 (S). Orange Co.: Fredholm 5416 (Io—76769, Po—127529, W—717215); Pieters 111 (W—511621). Osceola Co.: Fredholm 5944 (W—717355). Palm Beach Co.:

Baker s.n. [Belle Glade, Sept. 1925] (Fl--21118); W. B. Fox s.n. [Delray Beach, May 25, 1945] (We); O'Neill 852 (I); Small & Small 4337 (N, S, W--1737793). Pinellas Co.: M. H. Williams s.n. [Maximo, March 12, 1926] (H--26130). Polk Co.: C. C. Deam 64204 (No-21221); J. B. McFarlin 5930 (Gg--237854). Saint Johns Co.: Rugel 156 (Bm, W--512025). Saint Lucie Co.: Small & Small 4341 (N). Taylor Co.: R. K. Godfrey 53548 (N). Wakulla Co.: Redfearn & Kral 2490 (N). Observation Island: Small & Small 4403 (N). Saint Vincent Island: McAtee 1761a (W--514792). Sanibel Island: Orrok s.n. [Sanibel, March 20, 1915] (W--910360); S. M. Tracy s.n. [Sanibel Isl., 18 May 1901] (N). ALABAMA: Mobile Co.: C. T. Mohr s. n. (W--771852). MISSISSIPPI: Hancock Co.: Demaree 29588 (N). Harrison Co.: Demaree 32278 (Le). Jackson Co.: Demaree 28367 (Le); C. L. Pollard 1191 (C, W--271773). ARKANSAS: Drew Co.: Demaree 13696 (Sm), 24748 (Bm). Washington Co.: Herb. Univ. Texas s.n. [Fayetteville, 2/29/27] (Au), s.n. [Fayetteville, 7/29/27] (Au, Au). LOUISIANA: Orleans Par.: Brenning s.n. [17.6.1904] (B); T. Drummond s.n. [New Orleans, 1832] (Lu, Lu, N, S), s.n. [New Orleans, 1833] (Lu). Plaquemines Par.: Lloyd & Tracy 22 (N); Tracy & Lloyd 22 (Cm, W--383534). Saint Bernard Par.: R. J. Lemaire 866 (Tl). Tangipahoa Par.: Correll & Correll 9239 (H--78635, N). Terrebonne Par.: Arceneaux 383 (It). TEXAS: Bell Co.: Wolff 3243 (Tr--22252). Bexar Co.: Clare 782 (Ar--257309), s.n. [San Antonio, 26/7/1932] (Ew); Metz 782 (I). Brewster Co.: B. H. Warnock 8020 (Rf). Comal Co.: Lindheimer 618 (Ka), 1077 (Au, Br, Ca--147513, Me, Me, Me, N, Ok--10372, Up--48536, W--502450). Gonzales Co.: Bogusch 969 (W--1328539), 1235, in part (Po--161325); Tharp s.n. [6.27.27] (Au); Tharp & Barkley 13850 (Au, N). Hardin Co.: C. L. Lundell 14079 (Ld). Hays Co.: Ecology Class s.n. [San Marcos, 10.12.30] (Au); Stanfield s.n. [San Marcos, summer 1898] (N). Jeff Davis Co.: T. Head 16 (Au--122665, St). Jefferson Co.: Kirn 2139 (Po--158770, Wi); E. J. Palmer 10692 (Du--205609, S, W-1569398). Kerr Co.: G. L. Fisher 32217 (W--1624194), s.n. [Kerrville, Aug. 27, 1932] (Bt--33826, St); Normand s.n. [Frio R. w. of Hunt, 9.30.1929] (Au); Parks & Cory 23921 (Tr), 23983 (Tr), 23984 (Tr); Whitehouse s.n. [n. of Hunt, 9.1.30] (Au, Au). Kimble Co.: Strandtmann s.n. [Aug. 19, 1941] (Au). Liberty Co.: E. J. Palmer 8557 (Gg--182162, W--1531847). Newton Co.: Tharp s.n. [7-28-39] (Au). Presidio Co.: Hinckley 2134 (N, N), 3982 (N), 4122 (N). Real Co.: Cory 39708 (Au), 39709 (N, N), 42774 (Au); Parks & Cory 27415 (Tr--16228); Tharp, Follansbee, & Thompson 51-1663 (Au--122662). Reeves Co.: Parks & Cory 12044 (Tr), 12045 (Tr), 12046 (Tr). Travis Co.: C. C. Albers 40003 (Au, Au, Au, Au, Au, Au); F. A. Barkley 13366 (Au, N); Herb. Univ. Texas s.n. [Austin, 10-1-

34] (Au, Au); Strandtmann s.n. [Aug. 1, 1940] (Au); Tharp s.n. [Capt. Aldrich, 11/12/31] (Au, Au), s.n. [Austin, 7-18-41] (Ca--882811, Sm). Uvalde Co.: Parks & Cory 23877 (Tr). Val Verde Co.: Cory 38068 (Au, Au), 38069 (N, N). Walker Co.: C. C. Albers 39010 (Au). County undetermined: Collector undesignated L.25-538 [Skillman] (Sr); Cottle s.n. [Skillman, Aug. 23, 1931] (Sr), s.n. [Skillman, Aug. 29, 1931] (Sr); Havard s.n. [Peña Colorado] (W--155628), s.n. [Cottonwood Spg.] (W--221166); Lindheimer s.n. [southern Texas, 1849--51] (N), s.n. [1850] (Ka). ARIZONA: Cochise Co.: Blumer U.213 (W--563590). Gila Co.: G. J. Harrison 4897 (To). Pima Co.: Pringle s.n. [banks of the Santa Cruz River near Tucson, July 18, 1884] (Bc, Br, Cm, Le, Po--158506, Up--17119, Vt, W). Pinal Co.: G. J. Harrison 4897 (W--1367744). Santa Cruz Co.: Pringle s.n. [1 July 1882] (C). CALIFORNIA: Los Angeles Co.: Braunton 532 (Ca--56839, Du--75594, W--465514), s.n. [Sherman, Nov. 1902] (Du--91157); A. Davidson s.n. [Los Angeles, 1892] (Du--91131); G. B. Grant 5057 (Du--75654), s.n. [Sherman, 2 Nov. '02] (Po--267667); Grinnell s.n. [Los Angeles river bottoms] (Du--86983); J. T. Howell 3174 (Gg--176993); McClatchie s.n. [near Pasadena, 12/17/1892] (N); C. B. Wolf 4093 (Ca--729498, Du--282943, Rs--5876, W--1845834). Orange Co.: L. M. Booth 1334 (Ca, Ca--537269, Po--201879, Ua--14737); Ewan 7731 (En, I); J. T. Howell 772 (Rs--655). Riverside Co.: Jaeger s.n. [July 15, 1921] (Du--140388); McClatchie s.n. [near Elsinore, 4/23/1892] (N). San Bernardino Co.: F. R. Fosberg S.4188 (N); I. M. Johnston s.n. [Upland, July 1917] (Po--4013), s.n. [3 km. south of San Bernardino, 2 Sept. 1924] (Po--47883); Munz & Johnston 11289 (Po--153388); S. B. Parish 5113 (Du--9539, W--414871), 5338 (N), 5919 (Ca--111249), 6441 (Au), 7149 (Po--126473), 9463 (Vi), s.n. [San Bernardino, Oct. 1891] (Ca, Ca--25152); Parish & Parish 1043 (Br, Du--91130, Io--92220); Roos 964 (Se--77353). Santa Barbara Co.: H. M. Pollard s.n. [north of Veronica Springs, Aug. 8, 1957] (Ca--176857, Gg--412067). MEXICO: Baja California: C. R. Orcutt 1302 (Ca--104823, Dt, Io), s.n. [7-15-85] (Ur), s.n. [7/15/1895] (Mi); Wiggins & Demaree 4734 (Ca--511510, Du--215362, Fs, Mi, N, Ob--68401, Po--213438, W--1587985), 4766 (Ca--511546, Du--219987, Fs, Mi, N, Ob--65512, Po--213545, W--1587979). Chihuahua: Edw. Palmer 364 (Pa). Coahuila: Edw. Palmer 1040 (Io, Pa, W--56173, W--1323117). BERMUDA ISLANDS: Main: Brown & Britton 373 (N, Up--45684, W--524936), 1631 (N); F. S. Collins 268 (N, W--717562); O. Degener 1304 (N), s.n. [July 21, 1921] (Ms), s.n. [July 24, 1921] (Ba); A. H. Moore 2874 (Gg--155393, N); Rankin s.n. [Walsingham, July 1, 1897] (Pr). Smith: A. H. Moore 2947 (Gg--155394, N). CUBA: Havana: Boldo 60 (Q), 112 (Q); Ekman 78 (S), 933 (S), 13107

(S); León 685 (N), 1343 (Ha, N), 13313 (Ha, N), 13440 (Ha, N), s. n. (Vi—4191), s.n. [Almendares] (Vi—4026); León & Edmund 8719 (Ha, N); J. T. Roig 3187, in part (Ha). Las Villas: J. B. Acuña Galé 17434 (Es, Es); Britton & Wilson 5771 (N); Combs 389 (Io—15353, Ka—61357, N, W—1484535); C. Wright s.n. [near Manacal, Trinidad, 1865; Herb. Sauvalle 1743] (Hv). Matanzas: Britton, Britton, & Shafer 292 (Es, N). Pinar del Río: Acuña & Zayas 19935 (Sm); Ekman 11333 (N, S); J. T. Roig 3187 (Es, N, S, W—1147101), 8493 (Es). Province undetermined: C. Wright 3659 [1865] (Pa, W—71966). ISLA DE PINOS: Britton, Wilson, & León 15256 (N, W—793637). JAMAICA: R. C. Alexander s.n. [22 Jan. '50] (N); N. L. Britton 1527 (N); Britton & Hollick 2704 (N); Fredholm 3175 (W—316019); W. Harris 9937 (N, W—656765), 11808 (Gg—31408, N, W—790870); Hartweg 1558 (Lu); C. R. Orcutt 2297 (Ca—430597); Webster & Proctor 5334 (S, W—2227703). HISPANIOLA: Dominican Republic: Ekman H.13985 (S, W—1712018); Fuertes 391 (N, W—658353), 1758 (N, W—759366). Haiti: Ekman H.5 (N, S), H.7229 (S), H.8642 (S, W—1413151); Eyerdam 201 (W—1303294), 432 (Se—20945, W—1303498). PUERTO RICO: Britton, Britton, & Brown 6019 (N), 7037 (N); Eggers 996 (Br), 1152 (W—1323133), s.n. [Sierra de Luquillo, April 1883] (W—1159327), s.n. [1883] (Cp); J. R. Johnston 742 (N); Moldenke & Moldenke 19546 (Es, Lg, N); "F. L. S." 8359 (N); F. H. Sargent 695 (W—1558570); Sintenis 767 (S, Sg—16119, W—1323135), 1074 (B, N, N, Pa, W—71961, W—1323134), 2010 (Es, Po—63865); Stevens & Hess 4260 (N); J. A. Stevenson 5335 (W—1475340). WEST INDIES: Island undetermined: Swartz s.n. [ind. occ.] (S, S), s.n. [West-Indien] (S). LOCALITY OF COLLECTION UNDETERMINED: Swartz s.n. (S, S); Von Rohr 35 [America meridionali; Macbride photos 22778] (Kr—photo of type, N—photo of type), s.n. (S).

VERBENA SCABRELLA Sessé & Moc., Pl. Nou. Hispan., ed. 1, 1: 6 [as "Uerbena"]. 1887.

Bibliography: Sessé & Moc., Pl. Nou. Hispan., ed. 1, 1 [La Naturaleza, ser. 2, 1: App.]: 6. 1887; A. W. Hill, Ind. Kew. Suppl. 7: 249. 1929; Perry, Ann. Mo. Bot. Gard. 20: 343 & 356. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 19 & 102 (1942) and [ed. 2], 33 & 199. 1949; Moldenke, Résumé 40 & 474. 1959; Moldenke, Résumé Suppl. 7: 3 & 8. 1963.

The original description reads: "Uerbena tetrandra spicis oblongis, foliis oblongis integerrimis caule simplici scabro. Fl. Mex. Ic. 16. Herba sesquidodrantalis caule simplici scabro erecto. Folia alterna oblonga sessilia, integerrima scabra. Spicae terminales solitariae laxae oblongae. Flores purpurei. Bracteae singulis floribus ternae subalatae ciliatae. Semina intra caosulam oblongam. Habitat in saxolis Cuyuacami circuitibus.

Floret Augusto. ①."

Nothing is known to me about this plant except what is stated in the original description. Perry (1933) says: "Apparently this species does not belong to the genus, but anything further regarding its identity is unknown to the writer." Dr. Maximo Martínez tells me that the type locality is probably Coyoacan, south of Mexico City, Federal District, Mexico.

xVERBENA SCHNACKII Moldenke, Phytologia 2: 150. 1946.

Synonymy: Glandularia peruviana x megapotamica Schnack & Covas, Revist. Argent. Agron. 12: 222 & 224--229, fig. 1B, 2, & 3 H--L, & pl. 12 A, B, D, & G. 1945. Verbena megapotamica Spreng. x V. peruviana (L.) Britton ex Moldenke, Résumé 369, in syn. 1959. Verbena peruviana (L.) Britton x V. megapotamica Spreng. ex Moldenke, Résumé 372, in syn. 1959.

Bibliography: Schnack & Covas, Revist. Argent. Agron. 12: 222 & 224--229, fig. 1 B, 2, & 3 H—L, & pl. 12 A, B, D, & G. 1945; Schnack & Gonzalez, Revist. Argent. Agron. 12: 290. 1945; Moldenke, Phytologia 2: 150. 1946; H. N. & A. L. Moldenke, Pl. Life 2: 82. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 164 & 199. 1949; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2212. 1951; Moldenke, Am. Midl. Nat. 59: 361. 1958; Moldenke, Résumé 224, 296, 369, 372, & 474. 1959; Moldenke, Phytologia 8: 121 (1961) and 10: 133. 1964.

Illustrations: Schnack & Covas, Revist. Argent. Agron. 12: 225—227, fig. 1 B, 2, & 3 H—L, & pl. 12 A, B, D, & G. 1945.

This is the artificially produced hybrid between V. megapotamica Spreng. and V. peruviana (L.) Britton, first produced in Argentina in 1945. The two parental species grow together in at least two states of Brazil, in Paraguay and Uruguay, and in at least one province of Argentina, so it is possible that this hybrid may yet be found in the wild. In fact, some of the anomalous specimens distributed as one or the other of these species may actually represent this hybrid. It should certainly have considerable horticultural merit, as both parents are handsome-flowered. The hybrid is named in honor of Benno Julio Christian Schnack (1910—), contemporary specialist on the genetics of cultivated plants and on the taxonomy of the Verbenaceae.

Schnack & Covas (1945) describe the plant as follows: "El porte vegetativo del híbrido es intermedio respecto a ambos padres. Los entrenudos miden de 3 a 5,5 cm de largo. Hojas de 3 a 6,5 cm de largo, con pecíolo de 4 a 7 mm (Lámina XII, A); borde de la lámina simple a doblemente lobulado-aserrado. Brácteas florales de forma intermedia respecto a ambos padres (Fig. 2, A). Pubescencia del cáliz semejante a las de G. peruviana, con los pelos más ralos y oblicuos. Flores con la cara superior del limbo de color lila rosado [Este color parece deberse a una mezcla de pigmento derivado de pelargonidina con pigmento derivado de delfinidina. Por otra parte ya es conocido en Glandularia (Lawrence, W. J. C., and J. R. Price, Genetics and chemistry of flower colour variation,

Biol. Rev., Vol. 15, no. 1, 1940) que un gene que condiciona la producción de pigmento derivado de pelargonidina es incompletemente dominante sobre un gene que cendiciona la producción de pigmento derivado de delfinidina, produciéndose en consecuencia una mezcla de los dos tipos de pigmentos.]; la intensidad del color es del mismo grado que en G. megapotamica, es decir el carácter diluído se ha comportado como dominante. Las papilas epidérmicas del centro de los lóbulos en la cara superior del limbo, son de forma intermedia respecto a ambos padres (Lámina XII, D). La cara inferior del limbo tiene pelos glandulosos raros, excepto en la extremidad de los lóbulos, alternando con pocos pelos simples. Tubo de la corola con pelos de tamaño intermedio respecto a ambos padres. Garganta de la corola con pelos moniliformes de color muy pálido. Limbo con los lóbulos de posición intermedia respecto a los padres (Fig. 1, B). Estambres superiores con lóbulos glandulosos apenas esbozados (Fig. 2, B). Estigma de forma y posición intermedia respecto a ambos padres (Fig. 2, C). Fertilidad del polen relativamente elevada (aproximadamente 65 o/o). En la meiosis del híbrido se observan irregularidades, como cadenas de cromosomas y cromosomas no apareados (Fig. 3: I, J, K y L), que indican que G. peruviana x G. megapotamica es un híbrido estructural heterocigota probablemente para una translocación simple, lo que sería la causa casi exclusiva de su esterilidad relativamente baja. Anteriormente hemos estudiado el híbrido G. santiaguensis x G. laciniata [=x V. covasii Moldenke] [Schnack, B., y G. Covas, Hibridación interespecifica en Glandularia (loc. cit.)], cuyo polen presenta una esterilidad próxima al 50 o/o, y cuyas especies paternas son relativamente poco diferentes desde el punto de vista morfológico. El estudio del híbrido G. santiaguensis x G. megapotamica [=xV. vaga Moldenke] indica en cambio una afinidad relativamente pequeña entre las especies paternas, según se deduce de su comportamiento citológico, traducido por otre parte en su polen completamente estéril; correlativamente las diferencias morfológicas son grandes entre G. santiaguensis y G. megapotamica. La fertilidad del polen y el comportamiento citológico anormal en una proporción baja en el híbrido G. peruviana x G. megapotamica, indican una afinidad estrecha entre G. peruviana y G. megapotamica. Paralelamente las diferencias morfológicas entre ambas especies paternas son relativamente pequeñas."

VERBENA SCHULZII Moldenke, Phytologia 3: 177—178. 1949.

Bibliography: Moldenke, Phytologia 3: 177—178. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 107 & 199. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 128 & 474. 1959.

Herb. 30—40 cm. tall; stems and branches acutely tetragonal, hollow, pilose-pubescent with short spreading hairs, somewhat less so in age, the hairs whitish or sordid; nodes annulate; principal internodes 2.5—7 cm. long; leaves decussate-opposite

and sessile; leaf-blades chartaceous, uniformly bright-green on both surfaces, lanceolate, 2.5--6 cm. long, 6--12 mm. wide, acute (or the upper only somewhat attenuate-acute) at the apex, somewhat clasping as the base, sharply and rather irregularly serrate along the margins, very scabrous above, scabridous and rather sparsely pilose beneath, especially along the larger veins; midrib slender, somewhat impressed above, prominent beneath; secondaries very slender, 6 or more per side, somewhat impressed above, sharply prominent beneath, ascending, slightly arcuate; veinlet reticulation rather obscure on both surfaces; inflorescence terminal, spicate; peduncles acutely tetragonal, 9--12 cm. long, rather abundantly spreading-pilose with stiff white hairs standing at right angles to the peduncles; spikes 5.5--8 cm. long, densely many-flowered; bractlets lanceolate-ovate, 5--7 mm. long, attenuate-acuminate at the apex, 1--1.5 mm. wide at the base, rather abundantly whitish-pubescent on the back and densely long-ciliate on the margins; calyx tubular, about 1 cm. long, 5-costate, abundantly white-pilose; corolla vivid-rose, the tube bright-rose, about 12 mm. long, densely pubescent on the outside above the calyx, the limb about 6 mm. in diameter.

The type of this rare species was collected by Augusto Gustavo Schulz (no. 284) -- in whose honor it is named -- in swampy ground on "tacurues" on a low campo at Colonia Benitez, Chaco, Argentina, on December 7, 1933, and is deposited in the Osten Herbarium at the Museo de Historia Natural at Montevideo. Thus far the species is known only from the original collection. Two herbarium specimens, including the type, and 4 mounted photographs have been examined by me.

Citations: ARGENTINA: Chaco: A. G. Schulz 284 [Herb. Osten 23148] (F--photo of type, N--isotype, N--photo of type, Sg--photo of type, Ug--type, Z--photo of type).

xVERBENA SCORTA Moldenke, Phytologia 5: 133. 1955.

Synonymy: Verbena halei x prostrata Dermen, Cytologia 7: 170. 1936. Verbena halei Small x V. lasiostachys Link ex Moldenke, Résumé 365, in syn. 1959. Verbena lasiostachys Link x V. halei Small ex Moldenke, Résumé 368, in syn. 1959.

Bibliography: Dermen, Cytologia 7: 170. 1936; Moldenke, Phytologia 3: 467 (1951) and 5: 133. 1955; Moldenke, Biol. Abstr. 30: 1093. 1956; Moldenke, Am. Midl. Nat. 59: 361. 1958; Moldenke, Résumé 224, 365, 368, & 474. 1959; Moldenke, Phytologia 8: 121 (1961) and 9: 166. 1963.

This is the hybrid between V. halei Small and V. lasiostachys Link, produced artificially in cultivation by Dermen in Massachusetts in 1936. The two parental species do not actually grow together anywhere in the wild, as far as I am aware, so it is not very probable that this hybrid will ever be found in the wild, unless one of the parental species eventually invades the territory now occupied the other in the southwestern part of the United States. It does not seem very likely that the hybrid would ever be regarded as possessing much horticultural merit.

VERBENA SCROBICULATA Griseb. ex Lorentz, Veg. Nordeste Prov. Entre Rios, ed. 1, 122 & 150, hyponym. 1878; Abhand. Kaiser. Gesell. Wiss. Götting. 24: [Symb. Fl. Argent.] 275—276. 1879.

Synonymy: Verbena hunzikeri Moldenke, Phytologia 2: 321—322. 1947. Verbena scribiculata Griseb. ex Moldenke, Alph. List Cit. 3: 913, sphalm. 1949.

Bibliography: Lorentz, Veg. Nordeste Prov. Entre Rios, ed. 1, 122 & 150. 1878; Griseb., Abhand. Kaiser. Gesell. Wiss. Götting. 24: [Symb. Fl. Argent.] 275—276. 1879; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 39, 44, & 102. 1942; Descole, Gen. & Sp. Pl. Argent. 2: Icon. Pl. Argent. pl. 165. 1944; Moldenke, Alph. List Cit. 1: 16, 56, 96, 177, & 195. 1946; Lorentz, Veg. Nordeste Prov. Entre Rios, ed. 2, 122 & 150. 1947; Moldenke, Phytologia 2: 321—322, 338, & 339 (1947) and 2: 482. 1948; Moldenke, Castanea 13: 117 & 119. 1948; Moldenke, Alph. List Cit. 2: 364, 367, 368, 374—376, 378, 389, 442, 458, 534, 552, 575, & 599 (1948), 3: 660, 661, 666, 672—674, 688, 703, 704, 732, 745, 746, 748, 781, 800, 804, 858, 863, 869, 907, 909, 913, 916, & 922 (1949), and 4: 1088, 1091, 1165, 1166, 1207, 1250, 1256, 1293, & 1302. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94, 98, 99, 107, & 199. 1949; Moldenke, Phytologia 3: 75 & 76 (1949), 3: 289, 290, & 305 (1950), and 3: 468. 1951; Stellfeld, Trib. Farmac. 19 (10): 167. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Inform. Mold. Set 48 Spec. [4] (1954) and 49 Spec. 3. 1954; Moldenke, Résumé 120, 128, 224, 360, 362, 366, 369, & 474. 1959; Moldenke, Phytologia 9: 365—367 (1963) and 10: 174, 175, & 497. 1964.

Branching perennial herb, 0.25—1 m. tall, somewhat woody at the base, erect to decumbent or prostrate; stems erect or procumbent, tetragonal, several feet long, somewhat pilose above; branches numerous, slender, ascending or subprostrate, irregularly and loosely pilose-pubescent with whitish hairs of various lengths and standing out almost at right angles to the stems, glabrescent in age, tetragonal; nodes annulate; principal internodes 1.5—5 cm. long; leaves decussate-opposite; petioles elongate, very slender, 4—16 mm. long, densely spreading-pubescent like the younger branches; leaf-blades thin-chartaceous, rather uniformly bright-green on both surfaces or slightly lighter beneath, deltoid-ovate or oblong-lanceolate, 1.8—5 cm. long, 9—24 mm. wide, regularly narrowed from the broad base to the attenuate-acuminate apex, truncate or subtruncate and entire at the base, cuneately prolonged into the petiole, coarsely and rather irregularly sharp-toothed along the margins with antrorse teeth, incised below, sparsely pilose or hirtellous-scabrous above, densely pilose-pubescent beneath, less densely so in age and the hair then mostly concentrated on the larger venation; midrib very slender, plane above, slightly prominulous beneath; secondaries very slender, 4—6 per side, ascending, only slightly arcuate, obscure or very slightly subimpressed above, obscure or slightly

prominulous beneath; inflorescence terminal, 2--3 cm. long, depressed-spicate, many-flowered; peduncles slender, continuous with the stems, rather densely pilose-pubescent like the stems, often with some gland-tipped hairs; spikes subternate, contracted and to about 3 cm. long and 3.5 cm. wide during anthesis, soon elongating to 5 cm.; bractlets narrowly lanceolate, 2--4 mm. long and 1 mm. wide, usually half as long as the calyx or even shorter, glabrate except for the long-ciliate margins, sharply attenuate or acuminate at the apex; calyx narrow-tubular, 6--8 mm. long, short-pilose on the 4 parallel ribs, otherwise subglabrate, the 5 sharply acute teeth 1--1.5 mm. long, irregular; corolla hypocrateriform, varying from blue, deep-blue, or blue-violet to bluish-lilac, rose-lilac, purple, vivid-rose, or violet-white, rose-pink in drying, easily deciduous, its tube 1.3--1.8 cm. long, more or less puberulent or pilose on the outside, hirsute inside, the limb to 1.3 cm. wide, the lobes deeply emarginate or cordate at the apex; stamens 4, the lower ones subsessile, the upper ones about equaling the mouth of the corolla-tube; filaments short; anthers 2-celled; style surpassing the lower stamens; stigma with one lobe capitate and the other linear; cocci about 3 mm. long, half as long as the fruiting-calyx, linear, smooth below, densely scrobiculate above except for the commissure.

The type of this much misunderstood species was collected by Paul Günther Lorentz and Georg Hans Emmo Wolfgang Hieronymus (no. 244) near San Lorenzo, Jujuy, Argentina, and was deposited in the herbarium of the Botanisches Museum at Berlin, where it was photographed by Macbride as his type photograph no. 17445, now destroyed. The type of V. hunzikeri was collected by Armando T. Hunziker (no. 6812) -- in whose honor it is named -- in the alder (Alnus) formation along the highway between Alto del Clavillo and Alpachiri, Tucumán, Argentina, on September 18, 1946, and is deposited in the Britton Herbarium at the New York Botanical Garden.

Lorentz (1878) lists this species as "GR. n. sp." and calls it species No. 1157 of the "Flora Sub-Tropical", from San Lorenzo, but without formal description. It is obviously related to V. phlogiflora Cham. and V. incisa Hook., whose densely pubescent calyxes at once serve to distinguish them. Grisebach (1879) says "Proxima V. phlogiformi Cham. et V. incisae Hook., distincta calyce brevior, corolla extus pilosa et foliis etiam supremis longiuscule et abruptim petiolatis."

It has been collected in sandy mud near riverbanks or among stones near mountain streams, in moist sand of riverbanks, dense thickets, fertile soil, and grassy ground, in shade, on campos, along small streams, and among tall herbs in very wet soil, at altitudes of 300 to 1800 meters, flowering in April, June, July, and from September to December. It is said to be cultivated in Brazil. Eyerdam & Beetle report that "in shade it grows tall, in sunny spots it spreads and is more or less decumbent...common" in Salta; Jörgensen refers to it as "abundant" in Catamarca; and Vervoorst says that it is a "characteristic element of Alnus woods" in Tucumán. Material has been misidentified and distributed in

herbaria as V. pulchra Moldenke.

The plant figured in color as V. scrobiculata by Descole (1944) on my determination is actually V. peruviana (L.) Britton. Some 20 years ago I regarded V. scrobiculata as the correct name for what are now known as V. incisa Hook. and V. peruviana (L.) Britton, since at that time I had not seen a photograph of the type collection of Grisebach's plant. This is the reason for my misidentification of the plant on which Descole's excellent plate was based. The V. briquetiana f. campestris Osten, V. briquetiana f. silvatica Osten, V. chamaedryfolia hybrida Osten, V. chamaedryfolia α melindres f. siccanea Osten, and V. megapotamica var. truncatula Briq., reduced by me to V. scrobiculata in my Résumé 360, 362, & 369 (1959), actually belong in the synonymy of V. incisa Hook.

The following collections distributed as V. scrobiculata or so cited by me in the past are actually V. incisa Hook.: Archer 4666; Bailetti 58; Bertoni 1942, 2251, 2342, & s.n. [Herb. Inst. Miguel Lillo 28412]; Ekman 1978; Fries 1104; Garolera & Romero 140; Henz 33438; F. C. Hoehne s.n. [Herb. Inst. Bot. S. Paulo 8712 & 23061]; Hunziker 773; Leite 250; Lillo 3220; Lourteig 487; A. Lutz 1505; T. Meyer 9799 & 15871; Moldenke & Moldenke 19721, 19724, 19739, & 19754; Monetti 1623 & s.n. [Herb. Inst. Miguel Lillo 31354]; Montes 1091 & 2435; Pastore 2007; Peirano s.n. [Herb. Inst. Miguel Lillo 32193]; Reitz 882; Rodrigues 576 & 907; Sampaio 7675 & 7705; Schreiter 515 & 8104; A. G. Schulz 277 & 3988; Schwarz 2052, 3124, & 3162; and Venturi 378. The following are V. moricolor Moldenke: Herb. Osten 8469 & 22534; Lillo 18111; and Parodi 9179. The following are V. nana Moldenke: Brade 7002; Edwall s.n. [Herb. Inst. Bot. S. Paulo 15732]; T. Meyer 2943; and A. G. Schulz 1466. The following are L. peruviana (L.) Britton: Archer 4625; Castellanos s.n. [Herb. Mus. Argent. 33875]; and T. Rojas 3395.

In regard to the mixup in interpretation of names for this taxon, the following notes by Osten are of interest: "Zu Herb. C. Osten No. 8046. Verbena 'Briquetiana'. Cf. Briquet Verbenaceae Balansanae in Annulaire du Conserv. de Genève 1903/04 (VII-VIII) p. 288. 1904. Cf. Briquet in Arkiv f. Botanik II no. 10. 1904. Die Arbeiten von Chodat (Plantae Hasslerianae) und Briquet so weit sie die Sectio 'Nobiles' Schauer betreffen, sind voll von Irrthumen. Ich habe Briquet von 2 Jahren eine grossere Sammlung von Verbenen gesandt mit meinen Bemerkungen, habe aber nicht einmal Empfangsanzeige erhalten. An Hassler sandte ebenfalls, habe von ihm schriftlich die Nachricht, dass er mit meinen Ansichten übereinstimmt (Hassler ist augenblicklich in San Bernardino, ich habe ihn leider nicht sehen können). Briquet behauptet, dass V. chamaedryfolia in Paraguay nicht vorkomme. Dis ist richtig soweit es sich um V. Melindres Gill. handelt. V. melindroides Cham. habe ich von Misiones und dürfte sie am Alto Paraná jedenfalls

auch in Paraguay vorkommen. Wenn man aber die rotblühenden Formen der Nobiles zu einer sp. coll. (turma, grex) V. chamaedr. zusammenfasst, so gehört diese Form 8046 jedenfalls dazu. Ich habe hier in Uruguay, in Paraguay, in Argentinien gefunden dass die Blütenfarbe der einzelnen Arten sehr constant ist, dass dieselbe Art rot, violett, weiss blüht, ist absolut ausgeschlossen (cf. Chodat in Plant. Hassl.). Soweit ich aus dem Beschreibungen Briquet's ersehen kann, hat er diese Form zu phlogiflora (megapotamica var. Tweediana) als forma truncatula gezogen. Sie hat nichts damit zu tun. V. phlogiflora ist hochwüchsiger, mit grösseren Blüten deren Farbe immer lila violett ist, deren Blütenstande sich nach dem Verblühen nicht verlängern sondern kopfförmig bleiben. Ich habe diese Form 8046 in meinem Herbar als 'Briquetiana' bezeichnet und halte sie für den Uebergang von V. incisa Hook. zu der V. scrobiculata Griseb. (Symbolae no. 1735). V. incisa Hook. aus der Araucariazone, s/Br. Uruguay [nur fluss littoral!]; V. scrobiculata = Tucumanzone, 'Alles flüsst!'" I regard Osten 8046 as V. incisa Hook.

In all, 28 herbarium specimens of the true V. scrobiculata and 6 mounted photographs, including the types of phototypes of all the names involved, have been examined by me.

Citations: BOLIVIA: Tarija: J. West 8275 (Ca--565128). PARAGUAY: Ponder 7708 (Je--7708). ARGENTINA: Catamarca: Jörgensen 1298 [Herb. Osten 11351] (N, N, Ug, W--921951). Jujuy: Eyerdam & Beetle 22302 (Ca--652223), 22598 (Ca--655675), 22673 (Ca--655626); Lorentz & Hieronymus 244 [Macbride photos 17445] (Kr--photo of type, N--photo of type); C. Skottsberg s.n. [near Urundel, 25/10/1948] (Go). Salta: Eyerdam & Beetle 22626 (Ca--655595); Killip 39612 (W--1953926); Pierotti 1223 (S); Rufz Huidobro s.n. [Salazuti, 8/VIII/44] (Ca); Schreiter 11467 (Ca--164770, Ut--115410b); A. G. Schulz 3433 (Sz), 5185 (Cb); Schulz & Varela 5267 (S, Z); Venturi 5056 (W--1548948), 8673 (W--1591413); Willink s.n. [Herb. Inst. Miguel Lillo 106867] (Ca). Tucumán: A. T. Hunziker 6812 (Ba, F--photo, N, N--photo, Si--photo, Z--photo); Mexia 4332 (Ca--560598); Sparre 922 (S); Vervoorst 4260 (Le).

VERBENA SEDULA Moldenke, Phytologia 5: 229. 1955.

Bibliography: Moldenke, Phytologia 5: 229. 1955; Moldenke, Biol. Abstr. 30: 3551. 1956; Moldenke, Résumé 81 & 474. 1959; G. Taylor, Ind. Kew. Suppl. 12: 149. 1959.

Herb, about 1 m. tall; stems and branches tetragonal, rather conspicuously sulcate and ribbed, brownish, glabrous; nodes annulate, often with white setulose hairs; principal internodes 3.5--5.5 cm. long; leaves decussate-opposite; petioles slender, 1.5--2 cm. long on mature leaves, glabrous or with a very few setulose hairs; leaf-blades thin-chartaceous, brunnescent in drying, ellip-

tic, 4—8 cm. long, 1—2.7 cm. wide, acute at the apex, rather irregularly serrate from below the middle to the apex, glabrous on both surfaces or with a very few scattered setulose hairs; midrib slender, subimpressed above, prominulous beneath; secondaries very slender, about 6 per side, subimpressed above, prominulous beneath; veinlet reticulation rather abundant but often obscure, sometimes the larger parts prominulous beneath; inflorescence terminal, forming an open panicle about 20 cm. long and 15 cm. wide, many-branched, the small flowers borne in spicate fashion on the branches, the individual spikes to about 14 cm. long and 5 mm. wide, densely many-flowered, the flowers contiguous and partly overlapping; peduncles and inflorescence-branches slender, tetragonal, glabrous or with a few scattered setulose white hairs; bractlets subtending each calyx lanceolate-ovate, about 2 mm. long, acuminate, more or less ciliate-margined toward the base; calyx tubular, about 3 mm. long, sparsely pilosulous, its rim 5-toothed; corolla white, hypocrateriform, about 4 mm. long, its limb about 3 mm. wide.

The type of this rare species was collected by Robert I. Bowman (no. 81) at an elevation of 2500 feet on the north slope of the main peak on Indefatigable (Santa Cruz) Island, Galapagos Islands, on February 15, 1953, and is deposited in the herbarium of the University of California at Berkeley. The species is known thus far to me only from the original collection. Only 2 herbarium specimens, including the type, have been examined by me.

Citations: GALAPAGOS ISLANDS: Indefatigable: R. I. Bowman 81 (Ca—13499—type, Z—isotype).

VERBENA SESSILIS (Cham.) Kuntze, Rev. Gen. Pl. 3 (2): 257. 1898.

Synonymy: Verbena stellarioides β sessilis Cham., Linnaea 7: 265. 1832. Verbena sessilis Kuntze apud Thiselt.-Dyer, Ind. Kew. Suppl. 2: 191. 1904. Verbena stellarioides var. sessilis Cham. apud Moldenke, Prelim. Alph. List Invalid Names 48, in syn. 1940; Schnack & Covas, Bol. Soc. Argent. Bot. 1: 284. 1946. Verbena stellarioides var. sessilis (Kuntze) Cham. apud Rosengurtt, Estud. Prad. Nat. Urug. 3: 236. 1943. Verbena stellarioides sessilis (Kuntze) Cham. apud Rosengurtt, Estud. Prad. Nat. Urug. 3: 237. 1943. Verbena senilis Kuntze ex Moldenke, Résumé Suppl. 7: 10, in syn. 1963.

Bibliography: Cham., Linnaea 7: 265. 1832; Schau. in A. DC., Prodr. 11: 541. 1847; Schau. in Mart., Fl. Bras. 9: 187. 1851; Kuntze, Rev. Gen. Pl. 3 (2): 257. 1898; Briq., Arkiv Bot. 2 (10): 11. 1904; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 191. 1904; Briq. in Chod. & Hassler, Plant. Hassler. 10: 480. 1904; Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1059. 1904; Hassler, Flor. Pilc. 101. 1909; Moldenke, Prelim. Alph. List Invalid Names 47 & 48. 1940; Moldenke, Alph. List Invalid Names 49 & 50. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 39, 41, 44, & 102. 1942; Rosengurtt, Estud. Prad. Nat. Urug. 3: 236—237. 1943; Schnack & Covas, Bol. Soc. Argent. Bot. 1: 284. 1946; Moldenke, Alph. List Cit. 1: 219 & 263 (1946) and 2: 457, 458, 533, 600, &

628 (1948), 3: 665, 688, 704, 749, 913, & 921 (1949), and 4: 1166, 1237, & 1295. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94, 99, 100, 107, & 199. 1949; Moldenke, Phytologia 3: 76 (1949) and 3: 377. 1950; Moldenke, Résumé 111, 118, 120, 128, 374, & 474. 1959; Moldenke, Résumé Suppl. 2: 13 (1960) and 7: 6 & 10. 1963.

A slender weak herb, 60 cm. to 1 m. tall, with the aspect of Stellaria holostea but somewhat more firm and with the leaves somewhat thicker; stems almost 1 m. long, about the thickness of the quill of a feather, mostly simple, sharply angled, the angles margined and subalate; leaves to 10 cm. long, "ad quatuor usque pollices elongata; inferiora caulis reliqui paulo longiora, foliis brevioribus instructa, infimis subsquamiformibus", 9 mm. wide, on smaller specimens shorter and broader, 4.5 cm. long and 9 mm. wide, sessile, subauriculate, very slightly decurrent, rather shortly attenuate at the apex, often serrulate, strigulose on the upper surface ("strigarum autem et dentium rudimenta et in var. α observabis identilatis speciei pignora"); bractlets shorter than the calyx; calyx tubular, about 6 mm. long, 5-veined, 5-toothed, the veins excurrent, unequally aristate, the upper bristles longer, 1 mm. long, the veins, bristles, and margins villous; corolla hypocrateriform, violet or indigo-violet to rose or even white, about 15 mm. long, surpassing the top of the spike, villous-sublanuginous and canescent on the outside, villous at the top inside and at the mouth, the throat spotted, long-tubular, the tube ampliate above, about 12 mm. long, the limb 5-parted, almost 10 mm. wide; stamens 4, didynamous, inserted slightly below the mouth of the corolla-tube; filaments short; anthers cordate-ovate; style setaceous, equaling the stamens, the apex clavate-thickened; stigma subapical, with a minute fleshy acute horn; cocci oblong, 4 mm. long, slightly thickened at the base, somewhat venose, the transverse veins elegantly areolate, the areolae quadrangular, "color illi griseus pallide nigrescens; carpello dorso octonervia, faciebus albidis angulo faciale nervoso."

The type of this poorly defined species was collected by Friedrich Sellow (no. 1563) in Brazil, and was deposited in the herbarium of the Botanisches Museum at Berlin, now destroyed, but is fortunately represented by Macbride's type photograph no. 17447. The V. morongii Britton formerly (1940, 1942) regarded by me as conspecific with V. sessilis seems, rather, to belong in the synonymy of V. stellarioides Cham.

Kuntze (1898) says: "Chamisso hat in Linnaea VII: 264 unter V. stellarioides 2 ganz verschiedene Arten, die in der Inflorescenz Bracteen, Blüthe wenig Unterschied zeigen, aber in der Blättern so sehr verschieden sind, dass ich sie als 2 Arten behandele: α decurrens Cham. = Verbena decurrens O. Ktze. Folia decurrentia integerrima margine revoluta aspera ceterum glaberrima. β sessilis Cham. = Verbena sessilis O. Ktze. Folia sessilia denticulata vel remote serrulata, supra strigulosa. Hierzu ex descr. V. Morongii Britton."

BOOK REVIEWS

Alma L. Moldenke

"BOTANY - an Introduction to Plant Science", by Wilfred W. Robbins, T. Elliot Weier & C. Ralph Stocking, 3rd ed., 614 pp., illustr. John Wiley & Sons, New York 16, New York. 1964. $8.95

This new edition should continue the book's favored position on many campuses because it is well organized and illustrated, modern and quite accurate, and clearly explicative in text, chapter summaries and the glossary for the beginning student. Many fine illustrations -- including several clear electron micrographs -- are sensibly taken from other texts. Original, but nearly duplicate, illustrations are a waste of time, energy and money, especially since the functional life of any science text is today very short because the rate of scientific progress is so rapid. The introduction is well worth being assigned reading.

A few desiderata are missed. There is no bibliography and there is very little reference throughout the text to the world's outstanding botanical writings and workers. The commendable showing of different systems of classification warrants an explanation. Indentations, letters and/or numbers would improve the key on page 17. There is no mention of sex in bacteria on page 373 despite so much modern experimental work in this field. The meaning of "stoma" is over-reached on page 86.

This work must have slipped by the proof-reader's desk unnoticed. Some of the typographic errors are "and" for "as" on p. 3, and the misspelling of "vinifera" on p. 8, "pond" on p. 53, "xylem" on p. 180, and "Sterculia" on p. 220. Labels should have been included on the drawing on p. 217; the legends on pp. 176 and 192 need correction; the plant name should be given in the legend on p. 245; "anabolic" and "catabolic" should be interchanged on p. 59. Split infinitives slipped through on pp. 65 and 67, and so did "referring back" on p. 55.

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"Poisonous Plants of the United States and Canada", by John A. Kingsbury, xiii +626 pp., illustr. Prentice-Hall, Englewood Cliffs, New Jersey. 1964. $13.00

This is a welcome reference book of value to botanists, chemists, physiologists, pathologists, veterinarians and physicians because of its well developed subject matter, its helpful Cornell Bulletin plant drawings and the author's clear photographs, and

its comprehensive bibliography of 1715 items. There are a tantalizingly few fine color plates.

The author first surveys the accumulated knowledge about 700 poisonous plants of the United States, including even Hawaii superficially, and of Canada. Then, well documented with formulas and basic configuration diagrams, he describes and locates by genera the toxic factors in these plants. The greater part of the text is devoted to the discussion of these plants by families in phylogenetic order, giving obvious botanical descriptions, poison symptoms, treatment and immunity.

The text is easily readable. Just a few minor items for correction are noted: the legends at the top of p. 293 are in reverse order. The following names in the Verbenaceae are to be preferred over those used in the text: Aloysia gratissima (Gill. & Hook.) Troncoso for "A. lycioides", Lantana camara var. aculeata (L.) Moldenke for "L. aculeata", and Lantana montevidensis (Spreng.) Briq. for "L. sellowiana".

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"Bacterial Photosynthesis", edited by Howard Gest, Anthony San Pietro & Leo P. Vernon, xvi + 523 pp., illustr. Antioch Press, Yellow Springs, Ohio. ["1963"] 1964. $6.00

This is Contribution No. 112 from the Charles F. Kettering Research Laboratory and consists of 40 excellent papers presented at an invitational symposium, the first such symposium devoted exclusively to this topic. The authors are outstanding workers from all over the world; the dedication is to their physical and inspirational mentor, Dr. C. B. van Niel.

The volume has the papers, each with its own bibliography and illustrative material, arranged according to the following topics: I. Components, structure, and function of the bacterial photochemical apparatus; II. Metabolism and physiology; III. Electron transport; IV. Phytochemical considerations. There follow a descriptive and taxonomic treatment of the photosynthetic families Chlorobacteriaceae (green sulfurs), Thiorhodaceae (purple sulfurs), and Athiorhodaceae (nonsulfur purples), a fine closing address summarizing the field and indicating the directions for future research, an additional bibliography, and a detailed index.

Since these bacterial systems have a more flexible biochemical apparatus that can readily be manipulated, much has been and can yet be learned that is applicable to the photosynthesis of higher plants.

Figure 15. Distribution of Verbena rigida in the United States

Herbarium curators who have material of this species from additional counties are asked to send it to the author for verification and record, so that future editions of this map may be more complete

Mapping by counties done by Andrew R. Moldenke

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COUNTY OUTLINE
UNITED STATES
Scale of Miles
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MAP NO. 125

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MISSOURI BOTANICAL

JAN 11 1965

NEW SOUTH AMERICAN ICHNANTHUS

10873

Jason R. Swallen

ICHNANTHUS FIRMUS Swallen, sp. nov.

Culmi 1.7 m. longi; vaginae internodiis multo longiores, papilloso-pilosae; laminae 15 cm. longae, 1.4-1.8 cm. latae, papilloso-pilosae, marginibus scabris; panicula 37 cm. longa, ramosis adscendentibus vel appressis usque ad 13 cm. longis; spiculae 4.5-6.5 mm. longae, brevipedicellatae; gluma prima acuminata; gluma secunda lemmate sterili longior vel brevior, 5-nervis, scabra, marginibus longe pilosa; fructus 3.2 mm. longus, alis latis 0.7 mm. longis.

Perennial; culms straggling, 1.7 m. long, papillose-pilose below the nodes; internodes mostly short, the sheaths much overlapping, keeled, papillose-pilose; blades up to 15 cm. long, 1.4-1.8 cm. wide, papillose-pilose-hispid on both surfaces, densely so just above the ligule, with white very scabrous margins; inflorescence 37 cm. long with narrowly ascending branches as much as 13 cm. long, the lower ones rather distant, the axis and branches papillose-pilose with long spreading hairs; spikelets 4.5-6.5 mm. long, short-pedicellate, appressed to the branches; first glume acuminate or awn-pointed, from shorter than the second glume and sterile lemma to exceeding them as much as 1.5 mm., 5-nerved, scabrous, sparingly covered, especially on the margins, with long papillose-based hairs; second glume and sterile lemma equal or subequal, 5-nerved, the glume acute, scabrous, hairy toward the tip, the lemma scarcely scabrous with only a few hairs at the summit; fruit 3.2 mm. long, yellowish, with broad obtuse wings 0.7 mm. long.

Type in the Herbarium Bradeanum, No. 25504, collected at Manaus, Amazonas, Brazil, January 26, 1963, by E. Santos 1499 et al. A piece of the type is in the U. S. National Herbarium.

ICHNANTHUS RECLIVIS Swallen, sp. nov.

Culmi ramosi glabri 1.2 m. alti; vaginae internodiis breviores, eae ramorm pilosae vel papilloso-pilosae; laminae usque ad 12 cm. longae, 2 cm. latae, glabrae; panicula 17 cm. longa, ca. 5 cm. lata, ramis adscendentibus infimis 7 cm. longis; spiculae 4-4.2 mm. longae, appressae, brevipedicellatae; gluma prima spicula 1/5 brevior, 3-nervis, scabra, pilis paucis ca. 4 mm. longis; fructus 3 mm. longus alis 1 mm. longis.

Perennial; culms erect at the woody base, arching, branching, glabrous, up to 1.2 m. tall; sheaths, at least the lower ones, shorter than the internodes, glabrous, those of the branches pilose or papillose-pilose with long hairs, with a very densely pubescent collar; blades as much as 12 cm. long, 2 cm. wide, glabrous, or the younger ones of the branches pubescent toward the base; panicle 17 cm. long, about 5 cm.

wide, with narrowly ascending branches, the lower ones 7 cm. long; spikelets short-pedicellate, appressed, 4-4.2 mm. long; first glume 4/5 as long to as long as the spikelet, 3-nerved, scabrous, especially on the nerves, with a few papillose hairs about 4 mm. long; second glume and sterile lemma equal, acute, 5-nerved, more or less scabrous; fruit 3 mm. long, yellowish, the wings 1 mm. long.

Type in the U. S. National Herbarium, No. 1500428, collected on cindery rocks among brush, between Bonito and Rondonopolis, Matto Grosso, Brazil, April 8, 1930, by Agnes Chase (No. 11894).

ICHNANTHUS SUBINCLUSUS Swallen, sp. nov.

Culmi basi duri, lignei, ramosi, infra nodis papillosi vel papilloso-pilosi; vaginae internodiis longiores, papilloso-pilosae pilis ca. 5 mm. longis; laminae 7-10 cm. longae, 1-1.7 cm. latae, anguste ovato-lanceolatae, infra dense pubescentes supra scabrae, pilis longis dispersis; panicula 20 cm. longa, 3-4 cm. lata, densa, ramis adscendentibus vel appressis; spiculae 5-5.5 mm. longae, brevipedicellatae, appressae; gluma prima spicula 1/5 brevior vel spiculam aequans, 3-nervis, scabra; fructus 3.6-3.7 mm. longus alis 0.6 mm. longis.

Perennial; culms hard and woody near the base, branching at the middle node, with several (6-10) internodes of roughly equal length, papillose or papillose-pilose at least below the nodes; sheaths longer than the internodes, papillose-pilose with spreading hairs about 5 mm. long; blades 7-10 cm. long, 1-1.7 cm. wide, narrowly ovate-lanceolate, densely and softly pubescent on the under surface, finely scabrous on the upper, often with long scattered hairs, especially near the base, the margins finely scabrous; panicle rather densely flowered about 20 cm. long, 3-4 cm. wide, partly enclosed in the uppermost sheath, the branches narrowly ascending or appressed; spikelets 5-5.5 mm. long, appressed, short-pedicellate; first glume 4/5 as long to as long as the spikelet, 3-nerved, scabrous, especially on the nerves; second glume and sterile lemma subequal, 5-nerved, the glume acute, the lemma rounded or blunt, enclosing a well developed palea as long as the lemma, densely pubescent at the tip; fruit 3.6-3.7 mm. long, with small wings 0.6 mm. long.

Type in the U. S. National Herbarium, No. 2382897, collected in cerrado, Campo Mourão, Paraná, Brazil, 625 meters, February 3, 1962, by G. Hatschbach (No. 8851).

ICHNANTHUS PUBESCENS Swallen, sp. nov.

Culmi erecti vel decumbentes ca. 65 cm. alti, nodis breve barbatis et internodiis pilosis; vaginae dense pilosae; laminae 6-7 cm. longae, 8-12 mm. latae, infra dense pubescentes supra glabrae basi pilis longis praeditae; panicula 17 cm. longa, 5-6 cm. lata, ramis solitariis usque ad 6 cm. longis; spiculae 4.8 mm. longae, appressae; gluma prima spicula 1/5 brevior vel paulum longior, acuta vel acuminata; fructus 3.3 mm. longus alis 0.7-0.8 mm. longis.

Perennial; culms erect or decumbent at the base, about 65 cm. tall, with shortly bearded nodes, the internodes appressed-pilose, especially below the nodes; sheaths nearly as long as the internodes, densely pilose, the hairs becoming longer toward the summit of the sheath; blades 6-7 cm. long, 8-12 mm. wide, acuminate, spreading, densely pubescent beneath, nearly glabrous above, with a few long hairs at the base; panicle long-exserted, 17 cm. long, 5-6 cm. wide, with solitary ascending finely scabrous branches, the lowermost 6 cm. long; spikelets 4.8 mm. long, appressed; first glume 4/5 as long to slightly longer than the spikelet, acute or acuminate, 3-nerved, scabrous on the keel; second glume and sterile lemma subequal, 5-nerved, the glume acute, the lemma blunt or rounded; fruit 3.3 mm. long, the wings 0.7-0.8 mm. long.

Type in the U. S. National Herbarium, No. 2304289, collected in campo cerrado, Fda. Morungava, Rio do Funil, Paraná, Brazil, December 12, 1958, by G. Hatschbach and R. B. Lange (No. 5276).

This species is obviously related to I. subinclusus Swallen, which has a larger and denser panicle partly enclosed in the sheath, erect or narrowly ascending panicle branches, and larger spikelets to 5.5 mm. long.

ICHNANTHUS NERVOSUS Swallen, sp. nov.

Culmi erecti, 165 cm. alti, glabri; vaginae internodiis multo breviores; laminae 12-22 cm. longae, 2.2-3.3 cm. latae, marginibus pubescentes vel plus minusve scabrae; paniculae 42 cm. longae ramis patentibus ad basin floriferis, infimo remoto usque ad 16 cm. longo; spiculae 4.5 mm. longae, appressae, nervosae; gluma prima spicula 1/3-1/2 brevior, 3-nervis; lemma sterile cucullatum; fructus 3.6 mm. longus, alis cicatricibus reductis.

Perennial; culms erect, 165 cm. high, glabrous or somewhat pubescent at the nodes; sheaths much shorter than the internodes, glabrous, densely pubescent in the throat; blades 15-22 cm. long, 2.2-3.3 cm. wide, somewhat narrowed toward the base, pubescent along the glabrous or somewhat scabrous white margins; panicle 42 cm. long, the branches spreading, floriferous to the base, the lowermost remote, 16 cm. long, very densely scabrous; spikelets 4.5 mm. long, appressed to the branches, strongly nerved; first glume 1/2-2/3 as long as the spikelet, 3-nerved, scabrous near the tip; second glume and sterile lemma equal, 5-nerved, the glume acute, the sterile lemma cucullate, scabrous near the tip, otherwise glabrous; fruit 3.6 mm. long, yellowish, the wings reduced to scars.

Type in the U. S. National Herbarium, No. 1645512, collected in a wood at Tapera, Pernambuco, Brazil, April 24, 1935, by D. Bento J. Pickel (No. 3855).

ICHNANTHUS GLABERRIMUS Swallen, sp. nov.

Culmi erecti, glabri, 60 cm. alti; ligula obsoleta; laminae ca. 16-22 cm. longae, 1.8-2 cm. latae, glabrae; panicula erecta, 25 cm. longa, 2 cm. lata, spiculis appressis; spiculae

4 mm. longae, purpureae, glabrae; gluma prima spicula 1/3 brevior, vel illum aequans; fructus 3.4 mm. longus, albus, alis latis 1.5 mm. longis.

Perennial; culms erect, 60 cm. tall, glabrous; leaves with no differentiation between sheath and blade, the blade about 16-22 cm. long, 1.8-2 cm. wide, acuminate, narrowed toward the base, glabrous, even the white margins; ligule wanting; panicle erect, 25 cm. long, about 2 cm. wide (possibly wider in mature panicles), with appressed branchlets; spikelets 4 mm. long, green, tinged with violet, glabrous or slightly scabrous; first glume 2/3 as long to nearly as long as the spikelet; second glume and sterile lemma equal, the glume acute, the lemma rounded; fruit 3.4 mm. long, white, the wings broad, 1.5 mm. long.

Type in the U. S. National Herbarium, No. 2382261, collected in Jalca Zone, 3 km. south of Pornacocha, east of Shipasbamba trail, Peru, 2400 m. altitude, June 20, 1962, by J. J. Wurdack (No. 1001).

Ichnanthus glaberrimus is related to I. duidensis Swallen, but in that species the spikelets are 5 mm. long, with a few long scattered hairs, and the leaves have a definite ligule between sheath and blade.

ICHNANTHUS LONGISPICULUS Swallen, sp. nov.

Culmi plus 60 cm. longi; vaginae internodiis breviores, glabrae, in collo dense villosae; laminae 11-18 cm. longae, 1.6-2.6 cm. latae, ad basin longe-villosae; panicula 25 cm. longa ramis solitariis, infimis usque ad 15 cm. longis; spiculae 6-6.5 mm. longae, glabrae; gluma prima acuminata, 3.5-4.5 mm. longa; fructus 3.5 mm. longus alis firmis 1 mm. longis.

Perennial?; culms more than 60 cm., perhaps more than 1 m. long; sheaths shorter than the internodes, glabrous with a densely villous collar; blades flat, somewhat asymmetrical, 11-18 cm. long, 1.6-2.6 cm. wide, narrowed toward the base, but not petiole-like, long-villous on the upper surface at the base, the white margins finely scabrous, otherwise glabrous; panicle about 25 cm. long with solitary or paired ascending to spreading branches, the lower as much as 15 cm. long with short ascending few-flowered branchlets; spikelets mostly in pairs, appressed, 6-6.5 mm. long, glabrous; first glume acuminate, 3.5-4.5 mm. long, 3-nerved; second glume and sterile lemma acuminate, or the sterile lemma somewhat blunt, 5-nerved; fruit 3.5 mm. long, yellowish, with firm wings 1 mm. long.

Type in the U. S. National Herbarium, No. 1447332, collected in forest at Tapera, Pernambuco, Brazil, February 16, 1930, by D. Bento J. Pickel (No. 2267). Collected at Tapera, also by Pickel, Nos. 1361, 2207.

ICHNANTHUS CONGESTUS Swallen, sp. nov.

Culmi graciles, lignei, ramosi, 1-2 m. longi, 1-2 mm. crassi; vaginae internodiis longiores marginibus conspicue villosis; ligula usque ad 5 mm. longa; laminae 8-11 cm. longae,

0.8-1 cm. latae, glabrae vel plus minusve pubescentes; paniculae 5-6 cm. longae, 1-2 cm. latae, densae, axis et ramis dense villosis; spiculae 3.5-3.7 mm. longae, brevipedicellatae; gluma prima spicula 1/3-1/4 brevior, pilis longis praedita; fructus 2.7-2.8 mm. longus alis 0.4 mm. longis.

Culms slender, woody, 1-2 mm. thick, branching, 1-2 m. long; sheaths longer than the internodes, conspicuously villous on the margins and across the back of the collar, the hairs soon falling off; ligule a prominent line of rather coarse hairs, as much as 5 mm. long; blades mostly 8-11 cm. long, 0.8-1 cm. wide (or the uppermost smaller), glabrous or somewhat pubescent, the margins finely scabrous; inflorescence 5-6 cm. long, 1-2 cm. wide with densely flowered branches as much as 3 cm. long, the axis and branches conspicuously villous; spikelets 3.5-3.7 mm. long, short-pedicellate; first glume acuminate, 2/3-3/4 as long as the spikelet, 3-5-nerved, with long hairs near the tip or occasionally nearly to the base, the hairs shorter downward; second glume and sterile lemma subequal, 5-nerved, the glume with a few hairs near the tip, the sterile lemma glabrous or nearly so; fruit 2.7-2.8 mm. long, the wings small but plainly evident, 0.4 mm. long.

Type in the U. S. National Herbarium, No. 1963481, collected between shrubs of thicket, Campo de Congonhas, São Paulo, Brazil, October 23, 1948, by D. Bento J. Pickel (No. 5893).

ICHNANTHUS CAMPORUM Swallen, sp. nov.

Culmi erecti 110 cm. alti, dense pilosi vel subglabri; laminae firmae, 16-20 cm. longae, 6-9 mm. latae, pilosae, marginibus prominentibus scabris; paniculae 10-13 cm. longae, ramis 6-8 adscendentibus; spiculae 5-5.2 mm. longae, inflatae, glabrae; gluma prima acuta, 3-nervis, 3-3.5 mm. longa; fructus 3.2 mm. longus, acutus, albus, cicatricibus parvis inconspicuis.

Perennial; culms erect from short rhizomes, 110 cm. tall, rather densely pilose to nearly glabrous; sheaths longer or shorter than the internodes, pilose like the culms; blades stiff, firm, 16-20 cm. long, 6-9 mm. wide, pilose on both surfaces, with prominent white scabrous margins; panicle 10-13 cm. long, with 6-8 ascending branches each bearing a few pairs of rather distant spikelets; spikelets 5-5.2 mm. long, inflated, glabrous; first glume acute, 3-nerved, 3-3.5 mm. long; second glume and sterile lemma equal, 5-nerved, the nerves prominent; fruit 3.2 mm. long, elliptic, acute, white, smooth and shining; scars small and inconspicuous.

Type in the U. S. National Herbarium, No. 1448744, collected in low brush, sandy clay campo, between Viannapolis and Ponta Funda, Goias, Brazil, 1000 m. altitude, March 17, 1930, by Agnes Chase (No. 11274).

Additional material examined: Brazil: Goias: Pirineus, Macedo 4378; between Viannapolis and Ponta Funda, Chase 11336; Annapolis, Chase 11343. Some specimens show a relationship with Ichnanthus procurrens (Nees) Swallen, comb. nov. (Panicum procurrens Nees), in that the spikelets are hispid and/or the blades are shorter and relatively broader, but the spikelets

are 5-5.2 mm. long, and more or less hispid. In I. procurrens the spikelets are 3-3.5 mm. long. These specimens, which seem to be hybrids, are Chase 11384 and 11386, both collected near Annapolis.

ICHNANTHUS RECLINATUS Swallen, sp. nov.

Culmi decumbentes ramosi, internodiis 3-5 cm. longis sparse pilosis; vaginae internodios subaequans, dense papilloso-pilosae; laminae 4-8 cm. longae, 5-10 mm. latae, infra et supra dense pubescentes; paniculae 3.5-5 cm. longae ramis brevis dense villosis; spiculae 5 mm. longae, appressae; gluma prima acuta vel breviaristata spicula 1/4-2/5 brevior; fructus 3.5 mm. longus alis 0.6 mm. longis.

Culms more than 1 m. long, straggling, branching, hard and woody, about 1 mm. thick, with numerous internodes 3-5 cm. long, sparsely pilose at least below the nodes; sheaths usually about as long as the internodes, sometimes a little shorter, rather densely papillose-pilose; blades erect or ascending, 4-8 cm. long, 5-10 mm. wide, slightly ovate, softly pubescent on both surfaces; inflorescence 3.5-5 cm. long with a few short branches densely flowered to the base, the branches and pedicels densely villous; spikelets 5 mm. long, appressed; first glume acute, apiculate or short-awned, 3/5-3/4 as long as the spikelet, 5-(3-) nerved, sometimes bearing a few hairs along the margins; second glume and sterile lemma acute or rather blunt, 5-(7-) nerved, usually with a few hairs; fruit 3.5 mm. long, pale yellowish, with wings about 0.6 mm. long.

Type in the U. S. National Herbarium, No. 2380658, collected in pinhal, Alto Matador, Rio do Sul, Santa Catarina, Brazil, altitude 800 m., October 16, 1958, by R. Reitz and R. Klein (No. 7257). One other specimen was examined which can be referred to this species: Brazil: Rio de Janeiro: Nova Friburgo, Curran 635.

ICHNANTHUS RIPARIUS Swallen, sp. nov.

Culmi graciles, ramosi, decumbentes, plus 50 cm. longi, subglabri; vaginae glabrae; laminae 5-8 cm. longae, 5-8 mm. latae, glabrae, marginibus scabrae; panicula 3-6.5 cm. longa, ramis dense floriferis; spiculae 3 mm. longae brevipedicellatae; gluma prima acuta spiculam subaequans pilis paucis praedita; gluma secunda lemma sterile aequans, 5-nervia, apeci pilis praedita; fructus 2.5 mm. longus alis cicatricibus 0.4 mm. longis reductis.

Culm slender, branching, straggling, more than 50 cm. long, glabrous or with a few long hairs; sheaths about as long as the internodes, glabrous, with a line of short hairs on the collar; blades 5-8 cm. long, 5-8 mm. wide, abruptly narrowed at the base to a short petiole-like base, minutely scabrous on the margins, otherwise glabrous; inflorescence 3-6.5 cm. long with several short densely flowered branches floriferous to the base; spikelets 3 mm. long, short-pedicellate; first glume acute, 3-nerved, nearly as long as the spikelet, with a few hairs at the tip; second glume and sterile lemma equal,

strongly 5-nerved, with a tuft of hairs at the tip of the second glume, the sterile lemma glabrous or nearly so; fruit 2.5 mm. long, with scars (minute wings) 0.4 mm. long.

Type in the U. S. National Herbarium, No. 975269, collected on the Campos de Bocaina, São Paulo, Brazil, April 12, 1894, by Löfgren and Edwall (No. 2403). This species was collected in the same general locality by A. C. Brade, April 2, 1951 (No. 20841).

ICHNANTHUS BACULARIUS Swallen, sp. nov.

Culmi graciles, radicati, 1 m. longi vel longiores, internodiis pilosis; vaginae internodiis multo breviores, glabrae, marginibus ciliatis; ligula erosa vel ciliata, 1-2 mm. longa; laminae 7-11 cm. longae, 10-15 mm. latae, marginibus valde scabrae; panicula 15 cm. longa, ramis adscendentibus vel patentibus usque ad 9 cm. longis; spiculae 5-5.4 mm. longae, glabrae, appressae; fructus 2.7 mm. longus alis cicatricibus 0.5 mm. longis reductis.

Perennial?; culms slender, tangled, leaning on other vegetation, over 1 m. long, with long stilt-roots from the lower nodes, the internodes pilose; sheaths much shorter than the internodes, glabrous across the back, with ciliate margins and a densely pubescent collar; ligule an erose or ciliate membrane 1-2 mm. long; blades 7-11 cm. long, 10-15 mm. wide, acuminate, scabrous on the nerves on the upper surface, smooth on the under surface, the margins very scabrous; panicles terminal and axillary, up to 15 cm. long, with more or less flexuous, ascending to spreading branches as much as 9 cm. long; spikelets 5-5.4 mm. long, appressed, glabrous or very sparsely pilose; second glume and sterile lemma subequal, or the glume a little longer, acute or acuminate, 5-nerved, scabrous toward the tip; fruit 2.7 mm. long, the wings reduced to scars, about 0.5 mm. long.

Type in the U. S. National Herbarium, No. 1500985, collected in tangled colony, rain forest, southeast slope of Serra do Caparão, Esperito Santo, Brazil, November 23, 1929, by Agnes Chase (No. 10079). Also collected on Serra do Caparão by Inez Mexia (No. 4011).

12223

TWO NEW GENERA OF OLYREAE FROM SOUTH AMERICA

Jason R. Swallen

Two closely related genera of the Olyreae have been known from South America. Diandrolyra Stapf was described in 1906, and Reitzia Swallen in 1956, the latter from Santa Catarina, Brazil. Two more are now to be added. Bulbulus Swallen was found by the writer at Santarém, Pará, and in the state of Maranhão, Brazil, in 1934. The type species of Piresia Swallen was first collected by André Goeldi along the Bragança Railroad, Pará, Brazil, in 1914, and more recently by Pires, Froes, and Silva, near Breves, Pará, Brazil, and in Surinam by Thomas Soderstrom. The other species of Piresia is based on Olyra sympodica Doell, described from French Guiana in 1877. This is the most widespread species of these four genera, ranging from Trinidad to Surinam, and Pernambuco, Brazil.

All the species are rare in forested regions, judging from the small number of specimens which have been collected. They may have been overlooked, however, because the inflorescences are usually hidden under the foliage and are not apparent.

Key to the Genera

Glumes of fertile spikelet 3-nerved.
  Nerves of glumes of fertile spikelet prominent; fruit pubescent; culms biform.....1. Piresia
  Nerves of glumes of fertile spikelet faint; fruit glabrous; culms all alike.....2. Reitzia
Glumes of fertile spikelet 5-7-nerved.
  Stamens 2; fruit glabrous.....3. Diandrolyra
  Stamens 3; fruit pubescent. Culms bulbose at base. 4. Bulbulus

1. PIRESIA Swallen, gen. nov.

Monoeca; culmi biformes, culmis fertilibus brevibus elaminatis, et culmis foliosis multo longioribus foliis in parte superiore congestis; spiculae masculae et femineae in eadem inflorescentia dispositae; fructus ellipticus, sessilis, pilis albidis villosus.

Culms of two kinds, the fertile ones short, bladeless, or with very much reduced blades, mostly hidden underneath the foliage, the leafy ones 7-25 cm. tall, much exceeding the fertile culms, the leaves congested in the upper part; staminate spikelets about 3 mm. long, subsessile, 1 (sometimes 2) below each pistillate spikelet; pistillate spikelets 1 or 2, terminating the main culm and branches; fruit elliptic, sessile, about 6 mm. long, the lemma and palea white-villous.

Type species: Piresia goeldii Swallen.

Key to the Species

Blades lanceolate, 4-5 cm. long, not more than 7 on each culm, crowded.....1. P. sympodica
Blades ovate-lanceolate, mostly less than 2.5 cm. long, as many as 20 on each culm, evenly spaced...2. P. goeldii

1. PIRESIA SYMPODICA (Doell) Swallen, comb. nov.
Olyra sympodica Doell in Mart. Fl. Bras. 2: 322. 1877.
Raddia biformis Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 358. 1917.
Raddia sympodica Hitchc. U. S. Dept. Agr. Misc. Publ. 243: 372. 1936.

Material examined: Trinidad: Caparo, Broadway 2375 (type of Raddia biformis Hitchc. & Chase), 8122; Tabaquite, Hitchcock 10127; Ortoire River, Guaya-quayari Road, Britton, Freeman, & Nowell 2530. British Guiana: Barima River, Archer 2524. Surinam: Soderstrom 53980. French Guiana: Karouany, Sagot 925 (type of Olyra sympodica Doell). Brazil: Pernambuco: Tpojuca, Pickel 3281.

2. PIRESIA GOELDII Swallen, sp. nov.

Culmi foliosi erecti, 7-14 (25) cm. alti, retrorse pubescentes, nodis dense barbatis, laminis 2-18 in parte superiore congestis, 1.7 cm. longis, 2.5-6 mm. latis; culmi fertiles 5 cm. alti, geniculati, spiculis femineis 2, appressis, 6 mm. longis, glumis 3-nervibus; fructus plus minusve obovatus, lemmate et palea pilis albidis villosis.

Perennial; leafy culms in small tufts, 7-14 cm. tall, erect or spreading toward the top, densely retrorsely pubescent in lines, the nodes spreading-pubescent, with 2-18 distichous crowded blades in the upper 1/3 or 1/4; lower sheaths much shorter than the internodes, glabrous, bladeless, the upper ones closely overlapping, pilose on the margins, the back pilose to glabrous; blades as much as 1.7 cm. long, 2.5-6 mm. wide, firm, ovate, sparsely papillose-hispid; fertile culms about 5 cm. tall, bladeless, with 2 appressed pistillate spikelets and 1 or 2 staminate spikelets beneath each pistillate one; staminate spikelets 3 mm. long, with 3 stamens; pistillate spikelet about 6 mm. long, firm, acute, glabrous, the glumes 3-nerved, the fruit slightly obovate, the lemma and palea villous.

Type in the U. S. National Herbarium, No. 1039650, collected in sandy humous places below second growth forest, Maguary-assú, Bragança Railroad, Pará, Brazil, June 1914, by André Goeldi (No. 72).

Additional material examined: Brazil: Pará: Breves, Pires, Froes & Silva 4908. Surinam: Soderstrom 54291.

2. REITZIA SMITHII Swallen, Sellowia 7: 8. 1956.

Material examined: Brazil: Santa Catarina: Azambuja, Smith & Reitz 6123 (type); Smith, Reitz & Klein 12255; Reitz 5939. São Paulo: Morro das Pedras, Brade 8107 (I.A.N.).

3. DIANDROLYRA BICOLOR Stapf, Kew Bull. Misc. Inf. 1906: 204. 1906.

"Native country unknown. Raised at Kew from seeds communicated by Messrs. Sander and Son." Known only from type material. It is undoubtedly tropical American since other genera, closely related to it, have been found there.

4. BULBULUS Swallen, gen. nov.

Culmi foliosi, inflorescentibus terminalibus; spiculae in paribus 2-5 dispositae, masculae longipedicellatae, femineae brevipedicellate; spiculae femineae acutae vel acuminatae, glumis 7-nervatis et fructu villoso; stamina 3.

Inflorescence terminating leafy culms, consisting of 2-5 pairs of spikelets, one of each pair pistillate, short-pedicellate, the other staminate, long-pedicellate; pistillate spikelets 7-8 mm. long, the glumes acute or acuminate, 7-nerved, the fruit 5.5 mm. long, villous, the margins inrolled covering the palea; staminate spikelets 5 mm. long, glabrous, containing 3 stamens.

BULBULUS NERVATUS Swallen, sp. nov.

Culmi caespitosi, erecti vel adscendentes, retrorse scabri, nodis barbatis; vaginae glabrae vel retrorse scabrae; laminae 2-4.5 cm. longae, 7-16 mm. latae, glabrae, breviter petiolatae; spiculae femineae 7-8 mm. longae, nervatae, acutae vel acuminatae; fructus 5.5 mm. longus, pilosus vel villosus.

Perennial; culms slender, in small dense tufts, 12-19 cm. tall, erect or somewhat spreading, retrorsely scabrous in lines, the nodes densely and shortly barbate; lower sheaths shorter than the internodes, bladeless or nearly so, glabrous, the upper 2-5 crowded, retrorsely hispid in lines, with normally developed blades; blades 2-4.5 cm. long, 7-16 mm. wide, acute, truncate-rounded or slightly cordate at the base, glabrous, with a petiole about 1 mm. long; panicles small, just exserted or partly enclosed in the sheath, composed of 2-5 short-pedicellate pistillate spikelets and 1 (sometimes 2) long-pedicellate staminate spikelets below each of the pistillate spikelets; staminate spikelets about 5 mm. long, very slender, glabrous, containing 3 stamens; pistillate spikelets on a short thickened pedicel, the glumes 7-8 mm. long, the nerves prominent, acute or acuminate, somewhat twisted; fruit 5.5 mm. long, light-yellowish, pilose or villous, the margins of the lemma inrolled covering the palea.

Type in the U. S. National Herbarium, No. 1612746, collected in high sandy forest from Caxias to Barra do Corda, Maranhão, Brazil, February 18-26, 1934, by Jason R. Swallen (No. 3552).

Additional material examined: Brazil: Pará: Santarém, Swallen 3284; Castanhal, Estrada de Ferra de Bragança, Goeldi 303. Territory of Amapá: Rio Oiapoque, Froes 26759 (I.A.N.).

MATERIALS TOWARD A MONOGRAPH OF THE GENUS VERBENA. XXV

Harold N. Moldenke

VERBENA SESSILIS (Cham.) Kuntze

Kuntze (1898) continues: "Schauer in DC. prod. und Flora brasiliensis stellt noch ex descr. eine dritte Art: V. montevidensis Spr. dazu, die aber nach dem Original-Exemplar gar keine Aehnlichkeit hat. Bei V. decurrens und sessilis sind die kopfigen Inflorescenzen sehr dicht, oben zur Blüthezeit fast flach, 2 cm breit und verjüngen sie keilig nach unten: die Bracteen sind flach, aufrecht, 1--1 1/2 cm lang in eine lange Spitze auslaufend und langhaarig gewimpert; die schlanke Corollenröhre steht 1 cm lang aus dem Kelch hervor; die Blätter sind lineallanzettig (1: 8--16) und bis 8 cm lang. Bei V. montevidensis Spr. sind die kopfigen Inflorescenzen locker und mehr oblong ährenartig, nur 3-5 mm breit, die Bracteen sind kahnförmig oval acut abstehend, kaum 2 mm lang, nicht gewimpert; die breite Corollenröhre überragt den Kelch kaum; die Blätter sind oval bis breitlanzettig (1: 1 1/2--2 1/2) nur 1/2--1 1/2 cm lang."

Verbena sessilis inhabits swamps and swampy meadows, wet soil and wet sand, grassy fields, shrubby campos, and wet tallgrass campos, and is found along rivers and highways. Jörgensen calls it "common". It has been collected in anthesis in January, March, May, September, and November. Rosengurtt (1943) describes it as "Hemicriptófita, florece a fines de primavera y verano. Habita en los bañados, siendo rara" and cites his B.2351, OH. 18494, and OH.18495. Schnack & Covas (1946) also cite Rosengurtt B.2351 (Si), while Briquet (1904) cites Regnell A.2039 from Paraguay.

Schauer (1847) describes our plant as "foliis sessilibus anguste lanceolatis obsolete serratis facie strigilis subtilibus conspersis, bracteis calyce nonnihil brevioribus". Chamisso's original description is "γ) sessilis foliis sessilibus lanceolatis obsolete serrulatis supra pagina strigulosis. E Brasilia meridionali utramque varietatem misit Sellowius." Although these authors agree that V. sessilis differs from V. stellarioides in having its leaves merely sessile, not decurrent, narrow-lanceolate, obsoletely serrate, sparsely strigillose, and the bractlets shorter than the calyx, it seems to me that the length of the bractlets is the only dependable character for separating the two taxa.

Herbarium specimens of V. sessilis have been misidentified and widely distributed as V. stellarioides Cham. On the other hand, the following specimens were distributed or cited by me previously as V. sessilis, but are actually V. stellarioides: Jörgensen 3773 [Herb. Osten 22241], Kuntze s.n., Morong 600, T. Rojas 1680 [Herb. Hassler 1680; Herb. Osten 8641] & 2527, and A. G. Schulz 285 [Herb.

Osten 23149] & 1468.

In all, 30 herbarium specimens and 5 mounted photographs, including the types or phototypes of all the names involved, have been examined by me.

Citations: BRAZIL: Rio Grande do Sul: Rambo 25786 (N). State undetermined: Sellow 1563 [Macbride photos 17447] (Kr--photo of type, N--photo of type, N--photo of type). PARAGUAY: Fiebrig 4031 (Bm, V); Hassler 2478 (Bm, V), 2478a (Bm, Cb, N--photo, V, Z--photo); Kuntze s.n. [Nord Paraguay, IX.92] (W--701065); Lindman A.2039 (S, S); Malme 928 (N, S, S); T. Rojas 174 (S). URUGUAY: Arechavaleta 19 (Ug, Ug), 3135, in part (Ug), s.n. [Herb. Osten 18494] (Ug); Berro 6721 (N), 7477 (N); Gallinal 742 [Herb. Osten 23356] (Ug); Gallinal, Aragone, Bergalli, Campal, & Rosengurtt A.1110 (N); Herter s.n. [Herb. Osten 18494] (Ug), s.n. [Herb. Osten 18495] (N, Ug, Ug). ARGENTINA: Formosa: Jürgensen 2477 [Herb. Osten 1367] (Ug, W--1055184); I. Morel 1707 (N).

VERBENA SETACEA Perry, Ann. Mo. Bot. Gard. 20: 339--340, pl. 15. 1933.

Bibliography: Perry, Ann. Mo. Bot. Gard. 20: 249, 250, 312, 339--340, 356, & 362, pl. 15. 1933; A. W. Hill, Ind. Kew. Suppl. 9: 295. 1938; Worsdell, Ind. Lond. Suppl. 2: 486. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 19 & 102. 1942; Moldenke, Alph. List Cit. 2: 467 (1948) and 3: 833. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 33 & 199. 1949; Moldenke, Résumé 40 & 474. 1959; Moldenke, Phytologia 9: 176 & 177. 1963; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1246. 1964.

Illustrations: Perry, Ann. Mo. Bot. Gard. 20: pl. 15. 1933.

Herbaceous or suffruticose at the base; stems decumbent or decumbent-ascending, branched, soft-pubescent; branches ascending, pilose-pubescent; leaves decussate-opposite, petiolate; leaf-blades 3--5 cm. long, cuneate-truncate at the base and narrowed into the margined petiole, trifid, softly villous-pubescent on both surfaces, the segments coarsely dentate, the lateral lobes small, the vein reticulation somewhat prominent beneath; spikes short-pedunculate; bractlets linear-lanceolate, about 3/4 as long as the calyx, soft-pubescent, ciliate, subulate-setaceous at the apex; calyx about 6 mm. long, villous-pubescent, its teeth 2 mm. long, about half as long as the tube, subulate-setaceous; corolla-tube about 7 mm. long, pubescent outside, the limb 6--7 mm. wide; anthers not glandular; mature cocci not known.

The type of this rare species was collected by Carl Albert Purpus (no. 195) among rocks, at an altitude of 1600--1700 feet, at Calmallí, Baja California, Mexico, between January and March, 1898, and is deposited in the herbarium of Pomona College at Claremont, California. The species is known thus far only from the type collection and was originally misidentified and distributed as V. ciliata Benth. Perry (1933) says "The gross habit of

this plant is very like that of V. Gooddingii var. nepetifolia. Unfortunately the inflorescence is immature and only a few flowers are in anthesis, hence it is rather difficult to say what are the characters of the spike or of the mature nutlets. Moreover, the corolla may be larger than appears in this specimen. The flower itself is similar to that of V. lilacina, but the two plants are so different in habit it would seem as if this were perhaps only a superficial resemblance. The species is readily distinguished by its general habit and long setaceous calyx-teeth."

Only one herbarium specimen and 3 mounted illustrations and clippings, including the type, have been examined by me.

Citations: MEXICO: Baja California: Purpus 195 (N--photo of type, Po--63919--type, Z--photo of type). MOUNTED CLIPPINGS: Perry, Ann. Mo. Bot. Gard. 20: 362, pl. 15. 1933 (W).

VERBENA SHREVEI Moldenke, Phytologia 2: 26--27. 1941.

Bibliography: Moldenke, Phytologia 2: 26--27. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 19 & 102. 1942; H. N. & A. L. Moldenke, Pl. Life 2: 83. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 33 & 199. 1949; Moldenke, Alph. List Cit. 3: 933 (1949) and 4: 1244. 1949; Shreve & Wiggins, Carnegie Inst. Wash. Publ. 591: 127. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 40 & 474. 1959; Moldenke, Phytologia 8: 196. 1962; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1246. 1964; Moldenke, Phytologia 10: 306. 1964.

Annual herb; stems decumbent at the base, slender, obtusely tetragonal, more or less densely spreading-pubescent with whitish often glandular hairs, often many-branched with erect or ascending branches, which are usually somewhat more densely spreading-pubescent; leaves decussate-opposite, petiolate or the uppermost subsessile; petioles very slender, 1--10 mm. long, more or less winged, densely hirsutulous or spreading-pubescent; leaf-blades chartaceous, rather uniformly green on both surfaces, elliptic in outline, 1--2 cm. long, 9--17 mm. wide, rather densely strigose on both surfaces, usually more or less 3-parted, the divisions sparingly incised-lobed, the lobes rounded at the apex; inflorescence spicate, elongating to 10 cm. or more, densely many-flowered, the rachis elongating even during anthesis and thus separating the individual flowers by 4--13 mm. toward the base of the spike; peduncles 1--4 cm. long, slender, obtusely tetragonal, densely spreading-pubescent or hirsutulous with whitish often glandular hairs; rachis similar to the peduncle in all respects; bractlets lanceolate, about 4 mm. long, shorter than the calyx, attenuate at the apex, densely glandular-pubescent on the back, densely long-ciliate with longer stiff white non-glandular hairs on the margins; calyx tubular, 5--6 mm. long, rather densely glandular-pubescent and also more or less scattered white-hirsutulous; corolla small, 7--8 mm. long, slightly projecting from the calyx, its tube minutely puberulent at the apex outside, the limb about 4 mm. wide.

The type of this species was collected by Forrest Shreve (no. 7119) — in whose honor it is named — at an elevation of 1900 feet,

19 miles northeast of Comondón [=Comondú], Baja California, Mexico, on March 16, 1935, and is deposited in his herbarium at Tucson, Arizona. Material of this species has also been found on volcanic mesas. Herbarium material has been misidentified and distributed under the names V. ciliata Benth., V. gooddingii Briq., and V. pumila Rydb. It is known thus far only from the type locality. In all, 5 herbarium specimens, including the type, and 2 mounted photographs have been examined by me.

Citations: MEXICO: Baja California: H. C. Orcutt s.n. [Pinery, 10-6-1882] (Mi); Shreve 7119 (Du--265832--isotype, Fs--type, Mi--isotype, N--isotype, N--photo of type, Z--photo of type).

VERBENA SIMPLEX Lehm., Nov. Act. K. Deut. Akad. Naturf. Halle 14 (2): 524. 1825; Ind. Sem. Hort. Hamb. 17. 1825.

Synonymy: Verbena angustifolia Michx., Fl. Bor.-Am. 2: 14. 1803 [not V. angustifolia Mill., 1768, nor Lam., 1947]. Verbena rugosa Muhl. ex Willd., Enum. Hort. Berol. 2: 633. 1809 [not V. rugosa D. Don, 1836, nor Michx., 1947, nor Mill., 1768, nor Sweet, 1845]. Verbena integrifolia Michx. ex Hook., Comp. Bot. Mag. 1: 176. 1836 [not V. integrifolia Sessé & Moc., 1889]. Verbena rugosa Willd. ex Hook., Comp. Bot. Mag. 1: 176, in syn. 1836. Verbena angustata Michx. ex Moldenke, Suppl. List Invalid Names 7, in syn. 1941. Verbena angustifolia L. ex Moldenke, Suppl. List Invalid Names 7, in syn. 1941. Verbena anusifolia Michx. ex G. L. Fisher, Am. Bot. Exchange List, sphalm. 1946. Verbena langustifolia Warne ex Moldenke, Alph. List Invalid Names Suppl. 1: 25, in syn. 1947. Verbena cuneifolia Wallberg ex Moldenke, Résumé 363, in syn. 1959 [not V. cuneifolia Hort., 1845, nor Raf., 1808, nor Ruíz & Pav., 1798]. Verbena angustifolium Michx. ex Moldenke, Résumé Suppl. 4: 14, in syn. 1962. Verbena angustifola Mx. ex Moldenke, Résumé Suppl. 11: 8, in syn. 1964.

Bibliography: Mill., Gard. Dict., ed. 8, no. 15. 1768; Michx., Fl. Bor.-Am., ed. 1, 2: 14. 1803; Poir. in Lam., Encycl. Méth. Bot. 8: 549. 1808; Willd., Enum. Hort. Berol. 2: 633. 1809; Pursh, Fl. Am. Sept. 2: 417. 1814; J. Sm. in Rees, Cycl. 36: no. 7. 1817; Michx., Fl. Bor.-Am., ed. 2, 1 [=2]: 14. 1820; Spreng. in L., Syst. Veg., ed. 16, 2: 747. 1825; Lehm., Nov. Act. K. Deut. Akad. Naturf. Halle 14 (2): 524. 1825; Lehm., Ind. Sem. Hort. Hamb. 17. 1825; Lehm., Del. Sem. Hort. Hamb. 1826: 16. 1826; Lehm., Nov. & Minus Cog. Stirp. Pug. 1: 37. 1828; Lehm., Nov. Act. Acad. Caes. Leopold. 14: 824. 1828; Sweet, Hort. Brit., ed. 2, 418. 1830; Hook., Comp. Bot. Mag. 1: 176. 1836; Eaton & Wright, N. Am. Bot., ed. 8, 470. 1840; Steud., Nom. Bot., ed. 2, 2: 749 & 750. 1841; J. Torr., Fl. State N. Y. 2: 53 & 570. 1843; D. Dietr., Syn. Pl. 3: 600. 1843; Walp., Repert. 4: 13, 18, & 32. 1845; Schau. in A. DC., Prodr. 11: 545. 1847; A. W. Chapm., Fl. South. U. S., ed. 1, pr. 1, 307. 1860; Bocq., Adansonia 2: 113. 1861-1862; Bocq., Rev. Verbenac. 33. 1862; A. W. Chapm., Fl. South. U. S., ed. 1, pr. 2, 307 (1865)

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Perennial herb; roots fibrous; stems chiefly erect, 1—6.5 dm. tall, very slender, tetragonal, simple or sparingly fastigiate-branched above, occasionally branched from the base, sparsely strigose-hispidulous; branches ascending, usually sparsely strigillose; leaves decussate-opposite or sometimes apparently whorled, sessile or subsessile, linear or linear-lanceolate to narrow-lanceolate, lanceolate, narrowly oblong, or spatulate, sometimes oblanceolate, 2.5—10 cm. long, 6—8 mm. wide, bright-green, obtuse or subacute at the apex, long-attenuate or tapering into the subsessile base, varying from entire to minutely sharp-serrate, subserrate, or serrulate, to distantly or coarsely and irregularly serrate, lineate- or reticulately rugose above and occasionally scabrous, somewhat prominently veined beneath, glabrate or sparsely strigillose on both surfaces, especially along the raised vein reticulation beneath; spikes slender or filiform, usually solitary at the apex of the stems and branches or subternate, strict, elongate, usually rather densely many-flowered, strigose-scabrid; bractlets lanceolate-subulate, commonly shorter than the calyx or subequaling its tube, glabrous or nearly so; calyx 3—4 mm. long, the teeth acute; corolla hypocrateriform, varying from deep-lavender, pale blue-lavender, or lilac to purple, pale purplish-blue, pale-blue, light-blue, blue, or light-violet, smoothish, its tube scarcely longer than the calyx, with scattered hairs at the mouth, the limb 5—6 mm. wide; fruiting-calyx angulate, 4—5 mm. long, sparsely pubescent, the lobes acuminate, recurved, surpassing the fruit; fruits crowded, the cocci linear,

2.5--3 mm. long, raised-reticulate above, striate toward the base; chromosome number: x = 7, 2x = 14.

It is worth noting here that according to Kanda the haploid number of chromosomes is 4. Patermann (1935), however, says "Anderseits ist es aber auch nicht ganz von der Hand zu weisen, dass die untersuchte Pflanze ein Bastard war, weil, wie auch schon Kanda angibt, häufig Zwischen-formen zwischen den einzelnen Verbena-Arten vorkommen, was um so mehr verständlich ist, als alle Arten der Gattung Verbena die Haploidzahl 6 besitzen."

Walpers (1845) classifies this species in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Micranthae, and Secondary Subgroup Holophyllae with 22 other species.

The type of V. rugosa Muhl. appears to be Muhlenberg s.n. [Herb. Willdenow 1119] in the Willdenow Herbarium at Berlin. The name, V. angustifolia L., is based on Herb. Vigener s.n., from material cultivated in the Botanical Garden at Heidelberg, Germany, while V. cuneifolia Wallberg is based on Wallberg s.n. from material cultivated in "Hort. Proprio", Sweden, in 1802, from seeds secured from Pennsylvania. It should be noted here that the V. angustifolia of Lamarck is V. gracilescens (Cham.) Herter, while that of Miller is Stachytarpheta angustifolia (Mill.) Vahl; the V. cuneifolia of Hort. is V. hispida Ruíz & Pav., that of Rafinesque is V. stricta Vent., while that of Ruíz & Pavon is a valid species, which see; the V. integrifolia of Seasé & Mocino is also a valid species; and the V. rugosa of D. Don and of Sweet are V. rigida Spreng., while that of Michaux is V. stricta Vent.

Willdenow's description (1809) of Verbena rugosa Muhl. is worth repeating here: "*VERBENA rugosa. V. spicis filiformibus solitariis terminalibus alaribusve, foliis lanceolatis, basi attenuatis integerrimis, lineato-venosis. Verbena rugosa. Mühlenberg. V. (angustifolia) humilis erecta, foliis lineari-lanceolatis rariter subserratis, spicis filiformibus. Mich. amer. 2. p. 14. Habitat in Pensylvania, Tennassée. ↳. F."

Verbena simplex has been found by collectors in dry or open dry soil, sandy or open sandy soil, clay or dry loam soil, rocky or hard rocky soil, sand, dry or DeKalb loam, open sterile or dry rocky ground, thin limestone or gravelly soil, waste ground, and rather poor soil along roadsides. It inhabits dry or sandy fields, fallow or pasture fields, open ground, old pastures, open fields and meadows, roadside waste places, sandy loam or wet clay meadows, open roadside ditches, cedar and limestone glades, old fields, prairie fields, woods and dry sandy woods, cleared or oak woods, shallow soil on limestone outcrops, limestone quarries and rocky limestone slopes, the talus of limestone ledges, open and roadside waste places, moist meadows, weedy roadsides, ditches, cinder beds of railroads, dry rocky places around stonepiles in hayfields, and bare rocky regions in general. It has been collected on sandy and low sandy prairies, moist or sterile prairies, bluffs and river

bluffs, steep dry or sandy banks, exposed cliffs, sand mounds, ballast, river flats and rocky bottoms, railroad tracks and embankments, low sandy or limestone hills, dry or sand hills, rocky or slate hillsides, rocky and rocky limestone slopes, creek banks, limestone slopes along creeks, limestone barrens, and gravel bars along streams, around old limestone quarries, in open woods, at the edges of woods and the foot of lime stone rocks, and along railroads, dry, clay, or open roadsides, rivers, and waysides, at altitudes of 400 to 2000 feet, flowering and fruiting from May to October.

Pammel & Fiske describe it as "common in sandy soil of creek bottoms associated with V. stricta, Potentilla canadensis, and Scutellaria parvula" and "common in sandy soil associated with Lithospermum canescens, Padus nana, and Fraxinus lanceolata". In Pennsylvania it is said by Stone (1945) to be "rare in moist sandy roadsides", flowering in early June, while Benner (1932) describes it as "rare and local" in "dry fields and waste places". Eames calls it "local in dry sandy fields" in Connecticut. Camp found it "scattered on limestone outcrops covered with Opuntia" in Virginia. Schallert refers to it as a "weed in dry fields" in North Carolina, while Cronquist calls it a "roadside weed" in Georgia. In Kentucky Wharton found it in black shale by a creek, McFarland says of it "usually in dry situations or in low places in fallow fields", while Braun (1943) reports it from "dry limestone soil of open slopes and roadsides". C. K. Dodge avers that it is "plentiful" in Saint Clair County, Michigan. In Tennessee McGregor calls it "abundant in shallow soil over limestone". In Arkansas it was found on basic soil on limestone by Robinson, while Dunn found it in "cutover oak woodland with regrowth 15--20 feet tall, fairly dense, clay soils".

In Illinois it inhabits "sandy humus underlaid by limestone", according to Chase, while G. N. Jones (1945) says "roadsides and fields. June--Aug.....said to hybridize with V. stricta, V. hastata, and V. bracteata", but F. E. McDonald calls it "rare" in Peoria County. Gates (1940) says that it grows in dry soil mostly in the southern 2/3 of the eastern third of Kansas and calls it a hemicryptophite. Other collectors in that state found it in fencerows, along the edge of bluegrass pastures, roadsides, open sandstone areas, rocky ravines in the prairie, sandstone outcrops, heavily grazed prairie pastures bordering a scrub oak woods with sandstone surfacing, in rocky soil on south-facing slopes near bottom of draw, sandy soil of gully in upland woods, shrubby prairie pastures, open places in prairies or sandy prairies and on rocky hillsides, in clay soil along roadsides, in clay-loam in flat areas where the soil has been removed for road fill, in rocky soil in bluestem prairies, rocky limestone swales, open places in swales in bluestem prairies, ravines in tall bluestem prairies, open places among grasses on rocky prairie hillslopes and in ravines, in loam of moist thickets, on rocky prairies slopes in the dry bluestem association, wastelands, sandy soil of

pastures and rocky prairie pastures, and in open places in ravines in rocky bluestem prairies. Hulbert calls it "scarce" and "very scarce", but McGregor describes it as "common" or "scattered"; Horr found it "scattered.

In Iowa, according to Thorne, it inhabits "sandy, alluvial flats and dry rocky ground, infrequent". Bush reports it as "common in barrens" in Missouri and McGregor found it "scattered to common on rocky hillsides" there, while Palmer (1935) says "Prairies, fields, and glades. Calciphile to circumneutral. Eastern, central, and southern Mo., south and east of a line drawn from Marion and Boone counties to Jackson Co." The Jesup 1955 collection cited below bears a notation to the effect that Prof. Tuckerman first discovered the species at that locality. In the Glass Flowers exhibit at Harvard University, model 509 is of this species, showing an opened corolla, a stamen, the pistil, and longitudinal and transverse sections of the ovary.

Common names recorded for V. simplex are "blue vervain", "burvine", "narrow-leaf vervain", "narrow-leaved verbena", "narrow leaved vervain", "narrow-leaved vervain", "pigmy vervain", "rugose vervain", "sand verbena", "verbena", "vervain", and "verveine à feuilles étroites". The plant is attacked by the following fungi: Aecidium verbenicola Ell. & Kellerm., Dicaeoma verbenicola Arth., Erysiphe cichoracearum DC., Puccinia vilfae Arth. & Holw., and Septoria verbenae Rob.

Specimens of V. simplex have been misidentified and distributed in herbaria under the names V. angustifolia x hastata Hill, V. caroliniana L., V. halei Small, V. hastata L., V. officinalis L., V. stricta Vent., Stachytarpheta angustifolia (Mill.) Vahl, and even Gerardia laevigata Raf. in the Scrophulariaceae. On the other hand, the C. R. Bell 4366, E. J. Palmer 10037, and S. M. Tracy 7533 & 8709, distributed as V. angustifolia or V. simplex, are actually V. halei Small; W. H. Chase s.n. [Madison, 7/27/1877] and W. H. Horr 6723 are V. hastata L.; Clevenger s.n. [Fletcher, Aug. 13, 1897] is in part V. hastata and in part V. urticifolia L.; Daniels s.n. [July 1903], Eggert s.n. [Pacific, 4 July 1896], W. H. Horr s.n. [Aug. 12, 1929] & s.n. [July 12, 1930], G. Merrill 571, and Rickett s.n. [Yancy Mills, Aug. 13, 1927] are xV. moechina Moldenke; A. Hayden 2 and H. A. Gleason 8845 (in part) are V. simplex var. eggerti Moldenke; R. L. McGregor 13217 is the type collection of V. simplex f. albiflora Moldenke; B. E. Smith 57 is Stylodon carneus (Medic.) Moldenke; Roy Morrison s.n. is Buchnera americana L. in the Scrophulariaceae; Paull s.n. [Oswego, 5/29/1886] is Lobelia puberula Michx. in the Lobeliaceae; and Jacobs 26 is Salvia azurea subsp. pitcheri (Torr.) Epling in the Lamiaceae. The Z. D. E. Brown s.n. [June 5, 1899], A. S. Hitchcock s.n. [Neosho Co., July 1896], and A. A. Jacobs s.n. [Monmouth, June 12, 1932], cited below, were all cited by Gates in his Kansas Flora as

"V. simplex x hastata", but I do not believe that they represent this hybrid. M. P. Somes 3301 is a mixture with xV. moechina.

The S. D. McKelvey 2523, cited below, is labeled "between Springfield and St. Louis"; M. W. Twaddell s.n. [July 22, 1869] may be from Augusta or Rockbridge County, Virginia, since its label is inscribed "between Staunton and Lexington". The specimen of Usteri 531 is inscribed "Brasilia", but was actually collected at Tottenville, Staten Island, New York!

The W. H. Rhoades s.n. [Sevierville Pike near Knoxville], cited below, has all its leaves broader than usual in this species. Deam says of his no. 20357a "very variable as to width and pubescence of leaves." Bohn 436, Eggert s.n. [12 Aug. 1875], H. A. Gleason 8845 (in part), Guttenberg s.n. [Sept. 10, '79], A. Hayden 2, Koenig s.n. [July 1878], Ruth s.n. [Knoxville, June 1900], Shacklette 609, and Sinclair, Dunn, & Spellman 913, all cited below, are rather too large, many-branched, many-spiked plants and probably should be regarded as var. eggerti Moldenke.

The M. S. Bebb s.n. specimen from Illinois, cited below, is marked "sp. ven." Schauer (1847) cites Michaux s.n. from somewhere in North America, Peter s.n. from Kentucky, Beyrich s.n. from Tennessee, and Durand s.n. from "Carolina", in the Berlin and DeCandolle herbaria. Harper (1920) records it with a question from Louisiana; Benner (1932) cites five collections from Bucks County, Pennsylvania; C. N. Jones (1941) cites Bartley & Pontius s.n. from Jackson County, Ohio; E. L. Braun (1943) records the species from Barren, Bell, Grayson, Hardin, Logan, Meade, Spencer, Todd, and Wayne Counties, Kentucky; Tatnall (1947) records it from Sussex County, Delaware, and from Dorchester County, Maryland; Deam, Yuncker, & Friesner (1946, 1948, 1951) record it from Hancock, Jay, and Washington Counties, Indiana. In Ohio Journ. Sci. 21: 133 (1921) it is recorded from Franklin County, Ohio, on the basis of a collection by J. H. Schaffner.

Steyermark (1963) records the species from Atchison, Bates, Benton, Butler, Caldwell, Callaway, Camden, Carroll, Cedar, Christian, Cole, Cooper, Crawford, Dade, Dallas, Daviess, Douglas, Gasconade, Hickory, Howell, Laclede, Livingston, Madison, Maries, Moniteau, Monroe, Morgan, Newton, Nodaway, Oregon, Osage, Perry, Pettis, Ralls, Ray, Ripley, Saint Charles, Saint Francois, Saline, Shannon, Texas, Vernon, Warren, Wayne, & Webster Counties, Missouri, on the basis of specimens in the herbarium of the Missouri Botanical Garden at St. Louis.

The species was apparently first introduced into cultivation in 1802 in Sweden, 1814 in Spain, 1822 in Belgium, and 1832 in France. MacDougal (1907) suggests that V. simplex may hybridize in the wild with V. bracteata. However, he cites no examples, gives no description, and does not actually say that he ever saw any such hybrid plants. I doubt very much whether the hybrid occurs, although G. N. Jones (1963) also claims that such a hybrid occurs in

Illinois. Van Vleet's surname is misspelled "Van Fleet" on some labels in the herbarium of the University of Oklahoma.

Perry (1933) cites the following 129 additional specimens and 1 photograph not as yet seen by me: ONTARIO: County undetermined: J. Macoun 1305 [Belleville] (G). VERMONT: County undetermined: W. H. Blanchard 26 (G), 60 (G). MASSACHUSETTS: Berkshire Co.: Hoffman s.n. [Sheffield, 27 Aug. 1902] (G). CONNECTICUT: New Haven Co.: D. C. Eaton s.n. [New Haven] (G); Harger s.n. [Fair Haven, 18 June 1886] (G). NEW YORK: Dutchess Co.: Hoysradt s.n. [Pine Plains, 1875] (G). County undetermined: Burnham s.n. [Tripoli, 25 July 1920] (G). NEW JERSEY: Bergen Co.: K. K. Mackenzie 4213 (E). Camden Co.: Brinton s.n. [Sicklerville, 21 June 1894] (G); Parker s.n. [22 June 1871] (G); Redfield 6430 (E). Union Co.: Trelease s.n. [Scotch Plains, 13 Aug. 1877] (E). PENNSYLVANIA: Chester Co.: Bartram 1021 (G). Franklin Co.: Green s.n. [Mercersburg] (G). Philadelphia Co.: Nuttall s.n. [Philadelphia] (G). York Co.: MacElwee 760 (E). County undetermined: Muhlenberg s.n. (E--photo). MARYLAND: Dorchester Co.: C. P. Smith 3186 (G). Montgomery Co.: H. D. House 1363 (E). DISTRICT OF COLUMBIA: Blanchard s.n. [Joy City, 19 June 1891] (E); Sudwith s.n. [Washington, 26 May 1889] (G). VIRGINIA: Bedford Co.: Curtiss s.n. [June 1873] (E). Botetourt Co.: A. B. Seymour 48 (G), 49 (E). Lee Co.: J. K. Small s.n. [about Cumberland Gap, 27 July 1892] (E, F, G). Loudoun Co.: H. D. House 875 (W). Smyth Co.: J. K. Small s.n. [Chilhowie, 4 Aug. 1892] (F). WEST VIRGINIA: Greenbrier Co.: Grimes 3716 (G). Lewis Co.: Small & Heller 432 (G). Monroe Co.: Steele & Steele 314 (E, G). NORTH CAROLINA: Buncombe Co.: Biltmore Herb. 4759b (G). SOUTH CAROLINA: Abbeville Co.: Hexamer & Maier s.n. [Abbeville District, July 1855] (G). GEORGIA: Catoosa Co.: J. K. Small s.n. [near Ringgold, 6--12 Aug. 1895] (F). FLORIDA: County undetermined: Rugel 127 [1842--49] (E, F). MISSISSIPPI: Oktibbeha Co.: C. L. Pollard 1312 (E, F, G). OHIO: Butler Co.: Overholts s.n. [Oxford, 16 June 1910] (E). Erie Co.: Moseley s.n. [Castalia, 27 July 1894] (G), s.n. [Sandusky, 28 July 1894] (F). ILLINOIS: Cook Co.: Greenman 1981 (E); H. H. Smith 5670 (G). Gallatin Co.: E. J. Palmer 15262 (E). Pulaski Co.: G. R. Vasey s.n. [Mound City, June 1859] (G). Randolph Co.: L. H. Pammel s.n. [Red Bud, 3 June 1888] (E). Rock Island Co.: Engelmann s.n. [Rock Island, 17 Aug. 1866] (E). Saint Clair Co.: Eggert s.n. [bluffs near Prairie du Pont, 20 June 1876] (E); Norton s.n. [East St. Louis, 9 July 1898] (E). Stony Island: Greenman 3640 (E); H. H. Smith 5923 (E, G). INDIANA: Harrison Co.: C. C. Deam 20357 (G, W). Saint Joseph Co.: Nieuwland 2685 (E). Tipton Co.: S. M. Deam s.n. [C. C. Deam 13619] (E). IOWA: Black Hawk Co.:

L. H. Pammel 272 (G). Johnson Co.: A. S. Hitchcock s.n. [Iowa City] (E). Louisa Co.: L. H. Pammel 1699 (E). County undetermined: Arthur 24 [17 July 1875] (E). KENTUCKY: Henry Co.: Eggleston s.n. [Smithfield, 30 May 1909] (N). Jessamine Co.: F. T. McFarland 109 (E). Lyon Co.: Eggleston 5237 (E). Simpson Co.: Anderson & Woodson 47 (E). Warren Co.: Price s.n. [Bowling Green, 21 May 1899] (E). TENNESSEE: Blount Co.: Curtiss 1955 (E, F, G). Carroll Co.: Biltmore Herb. 4759 (E, G). Cheatham Co.: Eggert s.n. [Kingston Spring, 5 Aug. 1897] (E). Davidson Co.: Eggleston 4430 (E). Hamilton Co.: Engelmann s.n. [Chattanooga, 25 Aug. 1876] (E). Knox Co.: Ruth 765 (E), s.n. [Knoxville] (F). WISCONSIN: Sauk Co.: Hale s.n. [Baraboo, 1861] (E, G). KANSAS: Anderson Co.: A. S. Hitchcock 791 (E, G). Linn Co.: Kellerman s.n. [Mound City, July 18, 1887] (E); Rydberg & Imler 120 (E). MISSOURI: Barry Co.: B. F. Bush 206 (E). Franklin Co.: Greenman 4125 (E); Kellogg 1130 (E); L. H. Pammel s.n. [Washington, 25 June 1888] (E); Trelease 713 (E). Greene Co.: Dewart 42 (E). Jackson Co.: B. F. Bush 7647 (E, G); Tindall s.n. [Independence, 1 June 1895] (E). Jasper Co.: E. J. Palmer 200 (E), 2981 (E), 3319 (E). Jefferson Co.: Eggert s.n. [20 June 1876] (E); A. S. Hitchcock s.n. [Victoria, 8 July 1890] (E); Riehl 456 (E); Steyermark 292 (E); Trelease s.n. [Crystal City, 14 May 1887] (E); Wislizenus 280 (E). Lincoln Co.: J. Davis 4552 (E). Macon Co.: B. F. Bush 7586a (E). Marion Co.: J. Davis 3588 (E). McDonald Co.: E. J. Palmer 4232 (E). Ozark Co.: E. J. Palmer 34766 (E). Phelps Co.: Kellogg 496 (E). Sainte Genevieve Co.: Greenman 4578 (E). Saint Louis Co.: Engelmann 336 (E), s.n. [banks of Mississippi above St. Louis, Oct. 1841] (E); King s.n. [mineral region southwest of St. Louis, June 1845] (E); Letterman s.n. [Allenton, 6 July 1911] (E). Stone Co.: E. J. Palmer 5769 (E). Taney Co.: B. F. Bush 450 (E). Wright Co.: Lansing 2976 (F, G), 3135 (F, G). Saint Louis: Engelmann s.n. [St. Louis, Sept. 1841] (G). ARKANSAS: Carroll Co.: Glatfelter s.n. [Beaver Station, Eureka Springs] (E). OKLAHOMA: McCurtain Co.: H. W. Houghton 3622 (E, G), 3646 (E, G). Osage Co.: G. W. Stevens 1980 (G). Ottawa Co.: G. W. Stevens 2299 (G). Rogers Co.: B. F. Bush 433 (E). Washington Co.: G. W. Stevens 2080 (G). The "Steele 314" which she cites is actually Steele & Steele 314; her "Hoyeradt" is a misspelling of Hoysradt; the Curtiss 1955, Pollard 1312, and Small s.n. [Chilhowie, 4 Aug. 1892], which she cites from "NY", are actually in the Columbia University Herbarium, while Short s.n. is in the Meisner Herbarium. She says "This species appears to be very closely related to V. hastata. In its typical form, it is readily distinguished by its elongate spikes and narrow leaves. Often, however, intermediate forms occur be-

tween the two, making it somewhat difficult to find clear lines of demarcation between them."

In all, 973 herbarium specimens, including the types of at least some of the names involved, and one mounted clipping have been examined by me.

Citations: QUEBEC: Jacques Cartier Co.: Holmes s.n. [Montreal] (T); Racine s.n. [Montreal, 17 juin 1934] (Um--255); Rouleau 1436 (Um--253). County undetermined: Dumas s.n. [Carré Chaptal] (Vi). Sainte Helene Island: E. Roy 2789 (N, Um--252, Vi, Vi), 3681 (Vi, W--1948911). Saint Paul Island: Rouleau 1125 (Vi). ONTARIO: Carleton Co.: Soper, Gillett, Calder, & Vick 3262 (Ca--882812, S). Hastings Co.: J. Macoun s.n. [July 10, 1871] (Mm--950). Victoria Co.: Bassett & Bragg 1474 (Vi). County undetermined: J. Macoun 54634 (N), s.n. [near Belleville] (Bm). NEW HAMPSHIRE: Grafton Co.: Jesup s.n. [25 June 1887] (Dt), s.n. [June 1894] (Dt). VERMONT: Bennington Co.: W. H. Blanchard 1 (Vt), 161 (N), s.n. [Arlington, July 1903] (Vt). Windsor Co.: Kittredge s.n. [Woodstock, July 24, 1918] (Vt). MASSACHUSETTS: Berkshire Co.: E. H. Eames 10365 (Dm). Hampshire Co.: Jesup 1955 (Dt). Middlesex Co.: Fernald s.n. [June 1894] (Dt). CONNECTICUT: Hartford Co.: T. Andrews s.n. [July 8, 1895] (We). Litchfield Co.: Eames & Godfrey 324 (Vi), s.n. [Kent, June 24, 1905] (Fl--21059). New Hanover Co.: M. Brandegee s.n. [New Haven] (Ca--468126); W. W. Denslow s.n. [New Haven, Aug. 1, 1866] (Ms); E. H. Eames s.n. [VIII.14.1893] (Vt); D. C. Eaton s.n. [New Haven, 1858] (S), s.n. [New Haven, 1859] (C); Harger 5832 (Vi); Kleeberger s.n. [New Haven, 6-22-1874] (Gg--31267); Safford 216 (W--515216); W. A. Setchell s.n. [Westville, Feb. 1885] (Ca--25177); W. W. Smith 10 (We); J. W. Wood s.n. [New Haven, June 1864] (Ms). County undetermined: Wright s.n. [Connecticut] (Go). NEW YORK: Bronx Co.: E. P. Bicknell 7337 (N), 7338 (N); Leggett s.n. [July 23d 1871] (Tc). Cattaraugus Co.: Fenno s.n. [July 30, 1903] (Al). Columbia Co.: McVaugh 2239 (Al, Up). Delaware Co.: P. Wilson s.n. [Arkville, July 9, 1915] (N). Dutchess Co.: Disbrow s.n. [Pine Plains, Aug. '03] (Nm, Nm); Hoysradt 86 (Ah), s.n. [Pine Plains, Oct. 1875] (Tc). Monroe Co.: Boughton 5762 (Al). Nassau Co.: E. P. Bicknell s.n. [Aug. 15, '03] (N). New York Co.: W. W. Denslow s.n. [July 1, 1867] (Ms). Queens Co.: Hexamer & Maier s.n. [July 31, '53] (Cm); S. O. Rusby s.n. [Woodhaven, July 1878] (Mi). Rockland Co.: H. N. Moldenke 7545 (N); Whitney 5374 (Al). Saratoga Co.: Cotton s.n. [June 28, 1905] (Al); H. D. House 10144 [June 30] (Al), 10144 [Sept. 18] (Al). Ulster Co.: H. D. House 25779 (Al). Washington Co.: S. H. Burnham s.n. [June 28, 1914] (Al). Westchester Co.: P. Wilson s.n. [Sept. 4, 1915] (N). Staten Island [Kings Co.]: Usteri 531 (B). County undetermined: W. W.

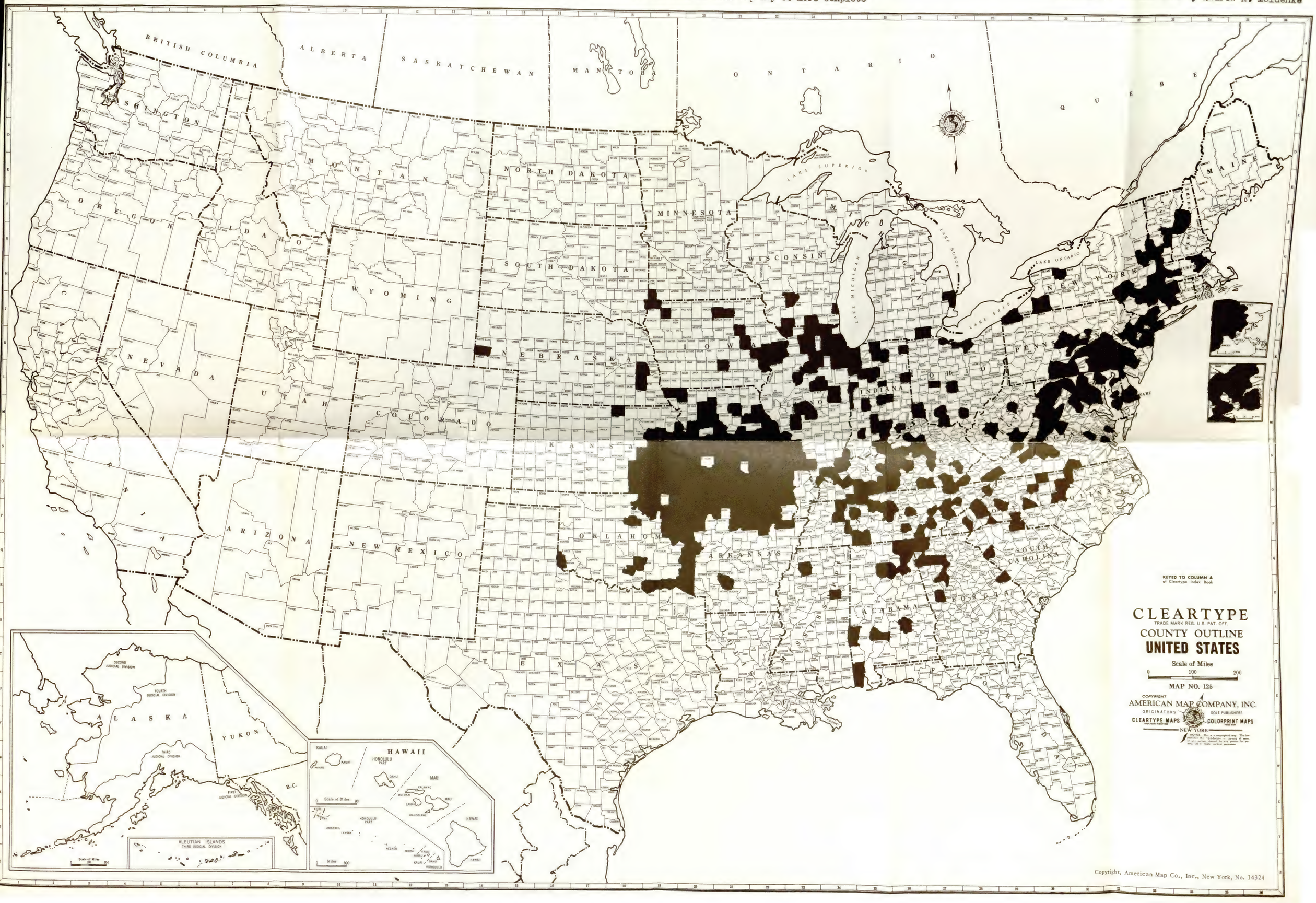
Denslow s.n. [New York] (Go); J. Torrey 749 (Al), s.n. [New York] (Bm, C, Mi, Pa); Torrey & Gray s.n. [N. Y.] (C). NEW JERSEY: Bergen Co.: Brinton s.n. [Closter] (Up--17073); Churchill s.n. [Englewood, July 1883] (Ba); L. Johnson s.n. [Hackensack Swamp, Sept. 6, 1876] (Lh); K. K. Mackenzie 4213 (N); Niederer s.n. [Carlstadt, July 26, 1883] (N); J. W. Wood s.n. [Lodi, July 1850] (Ms). Camden Co.: C. C. Stewart s.n. [Edmondson 2428] (N). Gloucester Co.: E. B. Bartram s.n. [June 23, 1907] (Um--60); I. Burk s.n. [Red Bank] (Up--17076). Hunterdon Co.: K. K. Mackenzie 5928 (N). Mercer Co.: Slack s.n. [Trenton] (Up--51869). Middlesex Co.: Monachino s.n. [Cheesequake State Park, July 4, 1950] (N). Monmouth Co.: N. L. Britton s.n. [Seabright, June 1877] (Tc); O. R. Willis s.n. [Freehold] (Mi). Morris Co.: F. C. Baldwin 81-1-2 (Nm); K. K. Mackenzie 7850 (N); E. Wall s.n. [Boonton, 19/6/31] (Ew, Ew). Passaic Co.: Hills s.n. [Paterson, June 24, 1894] (Fc); G. V. Nash 1064 (N), 1080 (N), s.n. [Clifton, July 31, 1892] (Ka, Lh); W. de W. Miller 1487 (N). Warren Co.: Teal s.n. [August 19, 1885] (Cm); C. S. Williamson s.n. [Asbury, June 23/07] (Up--47003). County undetermined: Brinton s.n. [Toppenton] (Up--17073); Knieskern s.n. (Br); Schneck s.n. [In a field between New York and Philadelphia, June 8, 1902] (Ur); Seaman s.n. (Pr). PENNSYLVANIA: Bedford Co.: Berkheimer 2675 (Ca--805800); O. E. Jennings s.n. [6/26/41] (Cm, Cm). Berks Co.: Wilkens 5191 (Gg--267619, Up). Centre Co.: H. A. Wahl 1316 (Ca--882813, No--8618, Pl--129972, Ur), 17474 (Hi--168733). Dauphin Co.: J. K. Small 106 (Ob--50753), s.n. [August 13, 1888] (Vt). Delaware Co.: Smith & Smith s.n. [Rhodes Swamp, June 10, 1865] (Up--17075). Erie Co.: Guttenberg s.n. [Sept. 10, '79] (Cm). Franklin Co.: True 27 (Up). Fulton Co.: Bright s.n. [Sept. 2nd, 1918] (Cm), s.n. [6-1-19] (Cm). Lancaster Co.: Disbrow s.n. (Nm); L. J. Miller s.n. [N. Lanc. Co.] (Vt); T. C. Porter s.n. [Aug. 26, 1862] (Cm); J. K. Small s.n. [vicinity of Conewago, May 28, 1889] (W--298656). Lebanon Co.: Arndt s.n. [Adamsdale, Aug. 22, 1916] (Up). Mifflin Co.: G. B. Grant 1434 [3060] (Po--267632). Montgomery Co.: Mumbauer s.n. [July 1, 1907] (St--22309). Northampton Co.: Tyler s.n. [Easton, 1892] (Dt). Perry Co.: Adams & Adams 2116 (Cm, Up); Gress, Jennings, & Jennings s.n. [July 25, 1920] (Cm). Philadelphia Co.: Martindale s.n. [Philad., July 1876] (Du--24173, Je--3149); C. F. Parker s.n. [June 1876] (C), s.n. [July 6, '78] (Pr). Schuylkill Co.: P. R. Wagner 7049 (Up). Snyder Co.: Wade & Wade 1726 (Up). York Co.: MacElwee 760 (N, Um--43); W. Stone 2165 (Up). County undetermined: Galen s.n. (Ur). DELAWARE: New Castle Co.: Brinton s.n. [Holly Oak, Aug. 19,

1888] (Up--17072). MARYLAND: Frederick Co.: W. E. Randall 4 (W--1927873). Kent Co.: Brinton s.n. [6/16/87] (Up--17074). Montgomery Co.: F. J. Hermann 9533 (Mi); C. S. King 2220 (La); Leonard & Killip 688 (Ur); Pieters s.n. [Cabin John, May 31, 1896] (Mi), s.n. [Chevy Chase, July 1, 1897] (Mi). Prince Georges Co.: T. Holm s.n. [Junii 5, 1900] (I). Talbot Co.: E. C. Earle 1504 (Up), 1640 (Up), 2773 (Up); Jump s.n. [June 16, 1937] (Up). Baltimore: W. R. Jones s.n. [Baltimore, June 22, 1904] (Mn--6887). DISTRICT OF COLUMBIA: F. Blanchard s.n. [19 June 1891] (N, Or--14720); E. S. Burgess s.n. (Ob--50754); Camby s.n. [D. C., 1881] (Fc--717); T. Holm s.n. [Junii 17, 1893] (I, S); Pieters s.n. [32nd & Canal Streets, July 30, 1899] (Mi); Rugel 196 (Br); C. S. Sheldon s.n. [June 1, 1881] (Al, Ob--97280); E. S. Steele s.n. [Washington, 1874] (Po--70657), s.n. [June 27, 1896] (Ob--50761); L. F. Ward s.n. [Washington, 1888] (Ka), s.n. (N). VIRGINIA: Albemarle Co.: F. Blanchard s.n. [Ivy City, June 19, '91] (Dt). Augusta Co.: Murrill s.n. [Ataunton, 23 May 1895] (Cm); M. W. Twaddell s.n. [between Staunton and Lexington, July 22, 1869] (Up). Bedford Co.: Curtiss 6715 (Mi), s.n. [June 6, 1871] (Al, Mi), s.n. [June 19, 1871] (S), s.n. [June 20, 1872] (Pu), s.n. (Mi). Botetourt Co.: A. B. Seymour 49 (Gg--358661, Lb--16172). Campbell Co.: Britton, Britton, & Vail s.n. [July 1, 1892] (C); Murrill s.n. [Lynchburg, 31 May 1927] (Fl--25520). Fairfax Co.: S. F. Blake 8473 (I); J. J. Carter s.n. [Falls Church, June 1876] (Tl); T. Holm s.n. [Septbr. 3, 1898] (I); Kinsley s.n. [June 26, 1888] (Ob--50757); W. R. Taylor 2810 (Up--75577). Fauquier Co.: Allard 1682 (N). Henrico Co.: MacCallum s.n. [Richmond, Aug. 1924] (Gg--144494). Lee Co.: F. C. Gates 17336 (Ka--79426); J. K. Small s.n. [about Cumberland Gap, July 27, 1892] (Ob--50760, Up--17071, W). Loudoun Co.: J. H. Holmes s.n. [Aug. 1888] (Lb--27617, Ua--11396), s.n. (Ur--22984); H. D. House s.n. [Bluemont, May 28, 1905] (W--492807). Mecklenburg Co.: F. R. Fosberg 15466 (Up). Middlesex Co.: Leonard & Killip 534 (W--1104588). Montgomery Co.: C. H. Hitchcock s.n. [Blacksburg] (Dt). Page Co.: Britton & Britton s.n. [Luray, Aug. 31, '85] (C); W. H. Camp 1364 (N). Roanoke Co.: C. E. Wood 5850 (Hi--51180). Rockbridge Co.: Brown, Hogg, Vail, Timmerman, Britton, & Britton s.n. [Natural Bridge, June 6, 1890] (V); F. H. Sargent 6908 (Gg--393050). Rockingham Co.: L. H. Bailey s.n. [Harrisonburg, July 1, 1918] (Ba); Shafer s.n. [Harrisonburg, Oct. 1888] (Cm); E. S. Steele 66 (W--2344483, We). Shenandoah Co.: Allard 9369 (W--1835067); Artz 570 (W--1634764). Smyth Co.: Britton, Britton, & Vail s.n. [June 23, 1892] (C, Cm); J. K. Small s.n. [Chilhowie, Aug. 4, 1892] (C).

Figure 16. Distribution of Verbena simplex in the United States

Herbarium curators who have material of this species from additional counties are asked to send it to the author for verification and record, so that future editions of this map may be more complete

Mapping by counties done by Andrew R. Moldenke



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CLEARTYPE
TRADE MARK REG. U.S. PAT. OFF.
COUNTY OUTLINE
UNITED STATES
Scale of Miles
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MAP NO. 125

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Washington Co.: W. H. Camp 1633 (N). County undetermined: R. C. Alexander s.n. [Valley of Virginia, 1850] (Ca--379993); C. S. Sheldon s.n. [Chain-bridge, 1 June 1881] (Ob--50752). Roanoke: Brown, Hogg, Vail, Timmerman, Britton, & Britton s.n. [May 29] (Bm); Small & Heller 432 (C). Williamsburg: Grimes 3738 (N). WEST VIRGINIA: Berkeley Co.: E. L. Core 5883 (We); J. L. Sheldon 2664 (We, We). Grant Co.: E. L. Core s.n. [Petersburg, July 13, 1935] (We); Davis & Davis 768 (We); West Va. Univ. Bot. Exped. 271 (We). Hampshire Co.: Frye 415a (We), 1219 (We), s.n. [June 20, 1933] (N); Koenig s.n. [July 1878] (Cm). Jefferson Co.: Davis & Davis 2908 (We); C. F. Millspaugh 865 (C, We); H. N. Moldenke 21764 (Bm); Puissant s.n. [Harper's Ferry] (Br); Strausbaugh 271 (We, We). Kanawha Co.: E. T. Harper 5687 (Cm). Mineral Co.: Strausbaugh s.n. [June 16, 1933] (We). Monroe Co.: Steele & Steele 314 (N, W--490291). Morgan Co.: Burton s.n. [Shady Grove Park, July 6, 1937] (Gg--267620, Sd--20296); Maysilles s.n. [August 30, 1941] (We). Pendleton Co.: E. L. Core 3676 (Ob--50755), s.n. [H. N. Moldenke 6822] (N). County undetermined: H. M. Gamble s.n. (We). NORTH CAROLINA: Buncombe Co.: Beadle s.n. [Biltmore, VII.1911] (La); Biltmore Herb. 4759b (N, W--332101). Burke Co.: Rugel s.n. [Morganton, June 17th, 1872] (W--310736). Chatham Co.: Kessler 573 (Hi--137459). Durham Co.: Blomquist 4710 (H--20440), s.n. [4/30/38] (Fl--12344); Fox, Godfrey, & Anderson 3624 (No--23139). Forsyth Co.: P. O. Schallert 1539 (H--5453). Gaston Co.: Columba 325 (I); P. I. Schmitt s.n. [June 1881] (I). Granville Co.: Ahles & Leisner 17402 (Hi--92929); Buell 1383 (No--8593); W. B. Fox 4910 (N). Jackson Co.: C. W. Galloway 2206 (Hi--54060). Madison Co.: J. D. Smith s.n. [Warm Springs, July 27, 1880] (W--1323042). Orange Co.: Ashe s. n. [near Chapel Hill] (W--327848); W. C. Coker s.n. [May 19, 1910] (Hi--59456); Collector undesignated s.n. [May 20, '91] (Hi--59452); A. Holland s.n. [May 21, 1929] (Hi--59453); H. R. Totten s.n. [June 15, 1915] (Hi--59455); Warnock s.n. [8/7/23] (Hi--59454). Polk Co.: E. C. Townsend 91 (Pl--87178), s.n. [Columbus, June 28, 1897] (W--341766). Rockingham Co.: G. de Chalmot s.n. [spray] (W--367383). Rowan Co.: Coit 1254 (No--8599); W. M. Davis s.n. [May 1882] (Up--17073). SOUTH CAROLINA: York Co.: Ahles & Haesloop 27167 (Hi--104399). GEORGIA: Bartow Co.: W. H. Duncan 8427 (Gu--29950). Catoosa Co.: J. K. Small s.n. [near Ringgold, Aug. 6--12, 1895] (C, Io--20749). Cherokee Co.: W. H. Duncan 8349 (Gu--29977). Clayton Co.: B. B. Higgins s.n. [Lovejoy, 7-1-29] (Ga). Dade Co.: W. H. Duncan 2600 (N). Floyd Co.: H. C. Jones 155 (Gu--19913). Fulton Co.: J. H. Barnhart 2253 [Herb. Barnhart

2697] (N). Richmond Co.: Cuthbert s.n. [Augusta, Aug. 7, 1900] (Fl—21057). Meriwether Co.: Wetherill s.n. [Warm Springs, Aug. 1882] (Up). Walker Co.: Cronquist 5280 (Gu—30233, N, Tl, W—1928668), 5299 (Ca—777467); P. Wilson 161 (N, W—384816). Whitfield Co.: R. M. Harper 385 (N, W—384817). FLORIDA: County undetermined: F. W. Chapman s.n. (C); Rugel 127 [1842—49] (W—511956). ALABAMA: Blount Co.: C. F. Baker s.n. [Blount Springs, 5/5/98] (Po—63885), s.n. [Blountsville, 5/6/98] (Cm, Ur, Vt, W—344791). Choctaw Co.: Schuchert s.n. [Cocoa, October 13—15, 1896] (W—288831). Cullman Co.: C. T. Mohr s.n. [Cullman, May 29, 1892] (W—771847); M. Morgan 69 (I). DeKalb Co.: Moldenke & Woods 507 (S). Etowah Co.: Moldenke & Woods 508 (S). Jackson Co.: Earle s.n. [Scottsboro, 6/30/99] (N); A. R. Moldenke 773 (S). Mobile Co.: Dukes s.n. [Mobile, June 1905] (Rf). Montgomery Co.: Farr s.n. [Montgomery, May 14, 1911] (Up—52678). Wilcox Co.: Buckley s.n. [July 1840] (T, W—771847). County undetermined: M. Martens s.n. (Br); G. R. Vasey s.n. [Alabama, 1878] (W); Winchell 138 (W). MISSISSIPPI: Oktibbeha Co.: C. L. Pollard 1312 (C, Po—70659, W—271684). Panola Co.: Herb. Univ. Ill. s.n. [Long Creek] (Ur). OHIO: Adams Co.: E. L. Braun s.n. [June 23, '26] (Cn); D. M. Brown s.n. [July 27, 1940] (N). Butler Co.: J. Ferguson s.n. [July 9, 1932] (Ob—80588); L. Roth s.n. [6/9/34] (Or—43759, Or—43760, Or—45393); Wehmeyer & Waters 42 (Mi). Champaign Co.: E. C. Leonard 1610 [Herb. Leonard 4351] (W—2161286), 19069 (W—1848487). Erie Co.: O. E. Jennings s.n. [July 8, 1911] (Cm); Moseley s.n. [Sandusky, July 28, 1894] (W—431257); L. H. Pammel 67 (Io—54037); T. Schoepfle s.n. [Sand Hill, May 31, 1896] (Mi); York s.n. [Cedar Point, 10 July 1902] (Up). Hamilton Co.: Aiken 10673 (Ll), s.n. [Aug. 20, 1904] (Po—267634); E. L. Braun s.n. [8/15/05] (Cn, Cn), s.n. [6/18/09] (Cn), s.n. [Aug. 9, '17] (Cn). Highland Co.: Bartley & Pontius 287 (N). Lorain Co.: Rudolph s.n. [6-8-96] (Ob—75327). Ottawa Co.: J. C. Britton s.n. [Lakeside, May 26, 1896] (Fl—21060); M. E. Day s.n. [July 30, 1893] (Ob—99795); Redick s.n. [July 15, 1890] (Ob—80589); B. H. Thorne s.n. [June 23, 1897] (Ob—80590); York s.n. [Lake Side, 8-1-1902] (Dp, Up). ILLINOIS: Boone Co.: E. W. Fell 52652 (Il—38878); Fell & Fell F.46390 (Il—21217). Champaign Co.: Winterringer 569 (Ur). Christian Co.: R. G. Mills s.n. [June 25, 1898] (Ur). Cook Co.: Arthur s.n. [La Mont, July 11, 1883] (Ah); H. H. Babcock 9380 (Bz—23723), s.n. [June '70] (Br), s.n. [Chicago] (W—787354); R. Bebb 1683 (Ok), 1684 (Ok), 1685 (Ok); S. A. Cain s.n. [Prairie, August 1926] (Bt—2467, Bt—2468); M. A. Chase 1374 (Ur), 1620 (Ur, Ur, W—443181), s.n. [Aug. 5, 1899] (Ur); G. D. Fuller 1220 (Il—16014); Fuller & Link 348 (Il—16012); E. Hall s.n. (W); E. J. Hill

152.1902 (Ur); F. W. Johnson 1753 (Go, N); Lansing 242 (Ur), 1393 (Ur, Ur); Munroe s.n. [Riverside] (Mi); L. T. Nelson s.n. [Chicago, June 1898] (N); Warne s.n. [July 1870] (Al). DuPage Co.: Munroe s.n. [Hinsdale, Aug. 1876] (Po--70662); P. B. Whitford 357 (Il--33828). Hardin Co.: Winterringer s.n. [May 29, 1949] (Ur). Jackson Co.: Fuller & Welch 918 (Il--15874); McCree 918 (Ur); A. B. Seymour s.n. [Aug. 19, 1880] (Ur--80010). Jo Daviess Co.: Ahles 4399 (Ur); V. H. Chase 6741 (Ur); Pepoon s.n. [Rush Tp., Aug. '84] (Ur); Winterringer 8039 (Il--37493). Johnson Co.: Schneck s.n. [Vienna, May 16, 1899] (Ur); Winterringer 3174 (Il--28407). Kane Co.: Boyce s.n. [Aurora, 1878] (Vt). Kankakee Co.: C. C. Crampton 363 (W--750626); E. H. Hill 72.1871 (Ur). Kendall Co.: Arthur s.n. [Oswego, Aug. 24, 1874] (Ah). LaSalle Co.: V. H. Chase 4065 (Ur); G. D. Fuller 2300 (Il--16011); McDougall 44 (Ur); R. G. Mills s.n. [July 3, 1944] (Ur); Raymound s.n. (Ur--17457). Lee Co.: Keithley 460 (Il--23257). Macoupin Co.: W. E. Andrews s.n. [June 21, 1889] (Ur). Marshall Co.: V. H. Chase 10660 (Ur, Ur). McHenry Co.: Benke 5686 (N); G. Vasey s.n. [Ringwood] (C). McLean Co.: L. M. Underwood s.n. [Normal, July 17, 1880] (Cm). Ogle Co.: Ahles 4537 (Ur); W. S. Moffatt 480 (Ur). Peoria Co.: F. E. McDonald s.n. [Peoria, Aug. 1898] (Ur); W. S. Moffatt s.n. [Romeo, Aug. 24, 1895] (Ur). Pope Co.: Ahles 2782 (Aa). Pulaski Co.: Herb. Univ. Ill. 30011 (Ur); Pearsall 19 (Il--22257). Putnam Co.: V. H. Chase 10664 (Ur). Randolph Co.: Winterringer 6711 (Il--34281). Saint Clair Co.: Brendel s.n. [1850] (Ur); Eggert s.n. [across from St. Louis, 13.6.75; Herb. Geete 5697] (Go); J. Neill 319 (Il--23398); Welsch s.n. (Ur). Sangamon Co.: G. D. Fuller 2275 (Il--16008); A. B. Seymour s.n. [Springfield Junction, 8 July 1879] (H--106463). Will Co.: Boyce s.n. [Joliet, June 14, 1881] (Io--92229); Umbach 1702 (S), 5720 (Ca--441522, Ka), s.n. [Romeo, Aug. 25, 1897] (Ur), s.n. [Romeo, June 18, 1898] (Hp, W--339476). Winnebago Co.: M. S. Bebb s.n. [Fountaindale] (Dt, N); R. Bebb s.n. [Rockford, Spring 1879] (Ok); E. W. Fell 51308 (Il--38605); Fell & Fell F.48-340 (Ur); G. D. Fuller 13746 (Il--31276); Fuller & Haine 247f (Il--16013), 2204h (Il--16009); L. H. Pammel 291 (Se--70052); Pammel & Fisk 291 (Io--126997); W. H. Rhoades s.n. [Rockford] (Hs), s.n. [near Rockford] (Hs). County undetermined: M. S. Bebb s.n. [Illinois] (Bm); R. Burgess s.n. [June 1883] (Io--92228); Eggert s.n. [Bluffs in Illinois, 13 June '75] (Cm, Gg--31271, Po--125373), s.n. [Bluffs in Illinois, 20 June '76] (Cm, N, W--754562); Mead s.n. (C); G. R. Vasey 1 (Il--16004). Stony Island: H. H. Smith 5923 (Ca--882565). INDIANA: Carroll Co.: Friesner 8836 (Bt--28517). Cass Co.: C. C. Deam 17878 (Dm), 48838

(Dm), 59003 (N); Ek s.n. [6-12-1936] (Bt--42533); Friesner 8789 (Bt--28887), s.n. [Logansport, 9/12/30] (Bt--5209, Bt--5210). Crawford Co.: C. C. Deam 16484 (Pu), 20383 (Dm); Schneck s.n. [July 4, 1893] (Ur). Daviess Co.: H. J. Clements s.n. [7/16/95] (Pu); C. C. Deam 25585 (Dm). DeKalb Co.: C. C. Deam 3234 (Dm, We). Harrison Co.: C. C. Deam 20357a (Dm), 58323 (N); Friesner 5669 (Bt--14149, Ca--540431, Ew, Lb--13544), 14366 (Bt--50988, Gg--310873, Gu--21559, H--68383, Ky, N). Jackson Co.: C. C. Deam 13519 (Dm). Jasper Co.: Welch 125 (Dp). Jefferson Co.: C. R. Barnes s.n. [Hanover, 6-23-76] (Pu); C. C. Deam 16195 (Dm); A. H. Young s.n. [Hanover, 1875] (Pr), s.n. [Hanover, May 12, 1880] (Pu), s.n. [Hanover] (Gg--31269). Kosciusko Co.: Friesner 15429 (Bt--54972). Lake Co.: F. C. Gates 1127 (Mi); F. W. Johnson 389 (N, N); E. D. McDonald s.n. [Hammond, June 12, 1942] (W--1888413); Umbach 1841 (Ca--441523). Lawrence Co.: Kriebel s.n. [near Georgia, 6-4-33] (Bt--19474). Marion Co.: C. C. Deam 6953 (Dm). Marshall Co.: C. C. Deam 31862 (Dm). Monroe Co.: V. Davis s.n. [Bloomington] (In--2286); Gheen s.n. [Bloomington] (In--2325); Gullion s.n. [Ellettsville] (In--4225); Wynn 63 (Au, Gu--27366). Newton Co.: M. McKee 866 (Dp). Porter Co.: H. R. Bennett s.n. [August 18, 1957] (Go). Posey Co.: C. C. Deam 16808 (Dm); F. J. Hermann 6640 (Mi, N). Putnam Co.: Grimes 163 (Dp). Saint Joseph Co.: Nieuwland 2685 (N, W--643884). Tipton Co.: S. M. Deam s.n. [C. C. Deam 13619] (Dm, Pu). Vermillion Co.: C. C. Deam 11944 (Dm). Warren Co.: Friesner 22854 (Ok, S, St). White Co.: Pipal s.n. [Monon, 7/11/12] (Ah). IOWA: Benton Co.: J. J. Davis s.n. [Vinton, 1877] (S), s.n. [Vinton] (Du--24172). Black Hawk Co.: A. S. Hitchcock s.n. [Waterloo, 8/28/89] (Io--15304); L. H. Pammel s.n. [Cedar Falls, Aug. 13, '08] (Io--78236, Io--78238), s.n. [Cedar Falls, VII-18-1927] (Io--129417); Pammel, Fisk, & Gilbert 272, in part (Io--127005, N); Shimek s.n. [July 1, 1921] (Ur). Cedar Co.: Fay 409 (Vi), 1017 (Ca--965064). Cerro Gordo Co.: A. Hayden 1, in part (N), 3, in part (N, N, N, N). Clinton Co.: C. R. Ball s.n. [June 30, 1898] (Io--15308); L. H. Pammel 7 (Io--53991). Floyd Co.: Collector undesignated s.n. (Io--15306). Johnson Co.: A. S. Hitchcock s.n. [Iowa City, June 1887] (Io--15305), s.n. [Iowa City, June 1, 1889] (Ka), s.n. [Iowa City, 1889] (Io--15307), s.n. [Iowa City] (Io--15303); R. F. Thorne 17397 (W--2328928); Treat s.n. [July 1865] (Ms). Lyon Co.: L. H. Pammel s.n. [Granite, Aug. 28, 1920] (Io--98606). Marion Co.: Brendel s.n. (Ur). Muscatine Co.: W. A. Anderson s.n. [east of Nichols, Sept. 9, 1936] (Ca--882564); Este & Brown s.n. [south of Muscatine, summer 1935] (Io--146364); Shimek s.n. [June 28, 1913] (N), s.n. [Aug. 21, 1915] (Ur), s.n. [Moscow, June 28, 1917]

(N). O'Brien Co.: Winge s.n. [Calumet, Maj 1911] (Cp). Scott Co.: E. A. Ross s.n. [Davenport, Aug. 1889] (Se--95717). County undetermined: Somes 3301, in part [Blackstrap] (W--672170). KENTUCKY: Allen Co.: H. A. Gleason 8907 (N). Anderson Co.: Wilburger 1955 (Ka). Bell Co.: H. A. Gleason 8845, in part (N). Bullitt Co.: W. H. Rhoades s.n. [Salt River] (Hs). Caldwell Co.: Sinclair, Dunn, & Spellman 913 (Lb--51376). Christian Co.: Ahles 7540 (Ur). Edmonson Co.: Lix 217 (W--1970472); Edw. Palmer s.n. [vicinity of Mammoth Cave, May 1899] (N, W--360416). Fayette Co.: Kellerman s.n. [Lexington, June 14, 1882] (Ka); F. T. McFarland s.n. [Lexington, May 27, 1915] (Ky--1776); R. Peter s.n. [Lexington, July 1833] (Mi); Short s.n. [Lexington, 1837] (Mi), s.n. (Ll). Franklin Co.: F. W. Pennell 10719 (N). Hart Co.: W. H. Rhoades s.n. [near Macon, July 1927] (N). Jessamine Co.: F. T. McFarland 109 (Ky, S, Vi); J. W. McFarland 1092 (Ky); Wharton 8906 (Hi--188364). Knox Co.: W. H. Rhoades s.n. [Wilton, July 1927] (N). LaRue Co.: F. C. Gates 17153 (Ka--80976); W. H. Rhoades s.n. [Attilla, July 1927] (N). Livingston Co.: Eggleston 4458 (N). Lyon Co.: Eggleston 5237 (N). Madison Co.: A. A. Wright s.n. [June 10, '76] (Ob--50758). Marion Co.: Wharton 4674 (N). McCreary Co.: H. J. Rogers 630 (Ky). Mercer Co.: F. T. McFarland 2988 (Ky). Nelson Co.: Agnes s.n. [June 10, 1933] (I). Perry Co.: R. Peter s.n. [July 6, 1833] (Ky--1777). Rockcastle Co.: Potzger 3196 (Bt--13397); Smith & Hodgdon 3705 (N, W--1725668); Wharton 2595 (Hi--188699). Scott Co.: Singer 178 (W--1465701). Taylor Co.: E. S. Lyon 12 (Ky). Union Co.: Shacklette 609 (Ky). County undetermined: R. Peter s.n. [Kent River, July 1833] (C); Short s.n. [1840] (M). TENNESSEE: Blount Co.: Curtiss 1955 (C, Du--90900). Carroll Co.: Biltmore Herb. 4759 (N, W--332100); Demaree 30781 (Au--122691, Au--122693, Hi--51367, Le, Mi, Ok). Carter Co.: J. D. Smith s.n. [July 8, 1880] (W--1323041). Claiborn Co.: F. E. Lloyd s.n. [Aug. 13, 1888] (Cm). Davidson Co.: Ainslie s.n. [June 1, '14] (Ka--67075), s.n. [Nashville, June 3, 1915] (Mi); P. V. Beck 326 (Ok); W. Bohn 436 (Lb--23710); Eggleston 4430 (Cm, Dt, N, W--586150); Hodges s.n. [Nashville, May 26, 1934] (Fl--1203); W. Palmer s.n. [Nashville, Nov. 7, 1897] (W--316318); Quarterman 821 (H--108462, Va), 1183 (Au); Shanks 1534 (Ca--882563); R. H. Ward s.n. [Nashville, March 1862] (Ur). Decatur Co.: Nason s.n. [May 1855] (Ur). Grundy Co.: Calef 565 (Ur); W. H. Rhoades s.n. [Mt. Eagle] (Hs); Richards & Maguire s.n. [Mount Eagle, June 6, 1930] (Ua--8843). Hamilton Co.: J. H. Barnhart 2283 [Herb. Barnhart 2727] (N). Henry Co.: A. R. Moldenke 112 (Fg). Humphreys Co.: Galloway s.n. [June 8, 1889] (Ob--50759). Jefferson Co.: Biltmore Herb. 4759c (S); Rugel 127 (Bm). Knox Co.: Lamson-Scribner s.n. [vic. of Knoxville,

June 1890] (W—264002); W. H. Rhoades s.n. [Sevierville Pike near Knoxville] (Hs); Ruth 731 (W—345916), 740 (N), s.n. [Knoxville, June 1895] (Gg, N, Ob—50750, Po—63886, S, Ur), s.n. [Knoxville, June 1900] (Dt). Lawrence Co.: G. Een s.n. [26.7.1950] (S). Mc Minn Co.: Moldenke & Woods 499 (S). Meigs Co.: A. R. Moldenke 777 (S). Montgomery Co.: A. R. Moldenke 109 (Fg). Roane Co.: Nease 517 (W—2175281). Rutherford Co.: Demaree 45755 (S); R. L. McGregor 16899 (Lw), 17160 (Lw). Stewart Co.: A. R. Moldenke 110 (Fg). Wayne Co.: McDougall 1059 (W—1925242). White Co.: Weatherby & Weatherby 6276 (N). Wilson Co.: C. C. Deam 61340 (N, Si); Demaree 45737 (S); W. H. Rhoades s.n. [near Lebanon, Aug. 1931; H. N. Moldenke 17076] (Bt, Bt—30665, N, St). County undetermined: G. B. Grant 2808 [3060] (Po—267633); Whelden s.n. [May '91] (Fl—21058). MICHIGAN: Lenawee Co.: D. Houghton s.n. [Sept. 14, 1838] (Mi). Saint Clair Co.: C. K. Dodge s.n. [Port Huron, July 12, 1897] (Mi), s.n. [July 8, 1903] (Mi, Ob—87444); A. Robinson s.n. [Port Huron] (Cm). WISCONSIN: Lafayette Co.: H. H. Smith 7783 (B, Ws). Milwaukee Co.: J. S. Douglas s.n. [Wis.] (Je—3147); Shinners 531 (Ws). Sauk Co.: T. J. Hale s.n. [Baraboo, 1861] (Ws). County undetermined: Skavlem s.n. [Harmony, July 3, 1890] (Ws). KANSAS: Allen Co.: A. S. Hitchcock s.n. [Allen Co., July 1896] (Ka). Anderson Co.: A. S. Hitchcock 791 (Ka, N, W—353582), s.n. [Anderson Co., July 1896] (Ka); W. H. Horr s.n. [July 22, 1929] (Lw); R. L. McGregor 4267 (Lw); B. L. Wagenknecht 3657 (Lw). Bourbon Co.: Kellerman s.n. [Ft. Scott, July 15, 1887] (Ka); Z. D. Thompson 541 (Lw). Butler Co.: R. L. McGregor 7257 (Lw). Chase Co.: Hulbert 3639 (Lw). Chautauqua Co.: A. S. Hitchcock s.n. [Chautauqua Co., Aug. 1896] (Ka); W. H. Horr s.n. [July 5, 1930] (Lw); R. L. McGregor 10826 (Lw). Cherokee Co.: A. A. Jacobs 70 (Ka—74127), s.n. [Monmouth, June 12, 1932] (Ka—77596); R. L. McGregor 1746 (Lw). Coffey Co.: W. H. Horr 3476 (Lw); Wimpey s.n. [Burlington, July 1896] (Ka). Cowley Co.: R. L. McGregor 10387 (Lw); M. White s.n. [June '98] (Ka). Crawford Co.: A. S. Hitchcock s.n. [Crawford Co., Aug. 1896] (Ka); W. W. Holland 298 (Lw); Hulbert 3750 (Lw). Douglas Co.: W. H. Horr E.76 (Au—121596, Ca—45188, Gg—396798, Lw, No—12739, Ok, S, St, Tl, Tl, Ur, Vi, W-2031047, We); R. L. McGregor 117 (Lw, S); Snow 6715 (Lw), s.n. [June] (Fl—21062); W. C. Stevens s.n. [Lawrence, June] (Ca—104832, W—216021). Elk Co.: Clothier & Whitford s.n. [Aug. 20 & 21, 1897] (Ka); R. L. McGregor 10337 (Lw). Franklin Co.: Hetzer 215 (Lw); R. L. McGregor 10057 (Lw). Greenwood Co.: A. S. Hitchcock s.n. [Eureka, July 1892] (Ka); W. H. Horr s.n. [July 28, 1930] (Lw); R. L. McGregor 10306a (Lw), 17220 (Lw). Johnson Co.: Pellet s.n. [June 1898] (Ka); Roofe s.n. [Spring Hill, May 1925] (Ka—

71597). Labette Co.: Clothier & Whitford s.n. [Aug. 18, 1897] (Ka); Etter s.n. [June 1, 1950] (N); Imler 322 (Ms); Imler & Rydberg 322 (Bl--42279, Lw). Leavenworth Co.: W. H. Horr s.n. [6/23/30] (Lw). Linn Co.: Kellerman s.n. [Mound City, July 17, 1887] (Ka), s.n. [Mound City, July 18, 1887] (C, Ka); H. N. Moldenke 21924 (Lw); Rydberg & Imler 120 (Lw). Lyon Co.: C. J. Elmore s.n. [Emporia, June 20, 1922] (Je--3146); H. A. Elmore s.n. [Emporia, June 20, 1922] (Je); W. H. Horr s.n. [6/26/30] (Lw). Miami Co.: Clothier & Whitford s.n. [Aug. 8, 1897] (Ka); R. L. McGregor 10476 (Lw); Oyster s.n. [Summer 1883; Herb. Prager 18630] (Gg--31266, Ob--50751); Rohrer 53 (St--20839); Rydberg & Imler 29 (Ka--74647, Lw, N); B. L. Wagenknecht 3719 (Lw). Montgomery Co.: W. H. Horr s.n. [July 5, 1930] (Lw); D. L. Marsh 408 (Lw); R. L. Mc Gregor 4327 (Lw), 14379 (Lw). Neosho Co.: A. S. Hitchcock s.n. [Neosho Co., July 1896] (Ka); W. W. Holland 108 (Lw); R. L. Mc Gregor 10275 (Lw). Osage Co.: Z. D. E. Brown s.n. [June 5, 1899] (Ka); B. L. Wagenknecht 4124 (Lw). Republic Co.: A. S. Hitchcock s.n. [Courtland, June 26, 1892] (Ka). Shawnee Co.: Maus s.n. [Auburn, July 23, 1927] (Ka--72217). Wabaunsee Co.: Carleton & Norton s.n. [Mill Creek, 7-14-1893] (Ka); Maus 74 (Ka--72513); R. L. McGregor 9160 (Lw). Wilson Co.: Darnell s.n. [June 1890] (Ka); W. H. Horr s.n. [July 13, 1930] (Lw); R. L. McGregor 10260 (Lw); Vaughn s.n. [Aug. 20, 1936] (Lw). Woodson Co.: Clothier & Whitford s.n. [Aug. 29, 1897] (Ka); W. H. Horr s.n. [7/11/30] (Lw); E. W. Lathrop 204 (Lw, W--2234984), 282 (W--2235008), 386 (Lw, W--2235049), 611 (Lw, W--2235112), 828b (W--2235153). County undetermined: Ripley s.n. [E. Kansas, June 19, 1899] (Je--3145). MISSOURI: Barry Co.: B. F. Bush 206 (Ka, S, W--318217), 15051 (Lb--15327). Barton Co.: Z. Williams s.n. [Milford, Aug. 1928] (Lb--4172). Boone Co.: Daniels s.n. [June 17, 1902] (Lb--9184), s.n. [Columbia, July 3, 1903] (Lb--4168, Lb--4169); Drouet 613 (Lb--12122), 3122 (Lb--25690); D. B. Dunn 12553 (Lb--38025). Carter Co.: R. L. McGregor 17182 (Lw). Cass Co.: Keetch s.n. [Lisle, July 1, 1934] (Je--3148). Clay Co.: Gier s.n. [VI-4-50] (Je--6799). Dent Co.: F. H. Sargent s.n. [May 29, 1932] (No--10919). Franklin Co.: J. M. Mason s.n. [Meramec State Park, 7/5/35] (Lb--34372); Muenscher & Winne 16728 (Au--122694, Ca--916312). Greene Co.: Blankinship s.n. [Willard, July 24, 1919] (Po--63845); McKelvey 2523 (W--1581464); P. C. Standley 8311 (W--687272), 9336 (W--688251). Grundy Co.: Crookshanks 85 (Lb--29655). Henry Co.: Drouet s.n. [May 22, 1932] (Lb--10344). Iron Co.: Churchill s.n. [Ironton, May 25, 1918] (Ba). Jackson Co.: B. F. Bush 285 (C), 343 (Ok), 477 (C), 914 (W--281373), 7647 (N, W--838033), 8647 (Ur), s.n. [7-3-1892] (Lb--4174); K. K. Macken-

zie s.n. [Lee's Summit, June 18, 1899] (N). Jasper Co.: Demaree 39338 (Z). Jefferson Co.: Hasse s.n. [May 14, 1887] (N), s.n. [June 1887] (Du—90901). Johnson Co.: E. J. Palmer 55904 (Lb—50951). Lawrence Co.: Spillman 298 (Pl—22609). Lincoln Co.: J. Davis 6074 (Du—87289), 6432 (Vi), s.n. [Silex, 29-5-15] (Au), s.n. [Whiteside, 1-6-15] (Mi), s.n. [Whiteside, 18-9-15] (Gg—31270), s.n. [7-6-16] (Vt). Macon Co.: B. F. Bush 7586a (N, Ur). Miller Co.: Damon s.n. [Kaiser, May 26, 1939] (Lb—34762); A. R. Moldenke 855 (Lw); Steyermark 13056 (Ky). Montgomery Co.: Drouet s.n. [June 6, 1931] (Lb—91844); C. O. Erlanson 1701a (Mi); Steyermark 77485 (Lb—43267). Phelps Co.: Fleenor s.n. [May 21, 1933] (Lb—11716); Meek s.n. [Rolla, 7-19-89] (Io—15340, Io—22905). Pike Co.: J. Davis 370 (W—503460). Polk Co.: Steyermark 24049 (N). Reynolds Co.: Rickett s.n. [Aug. 18, 1927] (Lb—4173). Saint Louis Co.: Eggert s.n. [12 Aug. 1875] (Cm); Engelmann 336 (Pr), s.n. [July 1839] (Br, Br, Br); C. Epling 6814 (La); Glatfelter s.n. [near St. Louis, 6-30-92] (Mi); M. Martens s.n. (Br). Stone Co.: E. J. Palmer 5769 (Po—217513, W—1581046). Taney Co.: D. Spencer 35 (Lb—35371), s.n. [8.1.40] (Lb—48913). Washington Co.: Brinker 708 (I). Wright Co.: Lansing 2976 (Ur), 3135 (Ur). County undetermined: Z. Baldwin s.n. (Au); Engelmann s.n. [Dapprich 7768] (Sm). Saint Louis: J. A. Drushel 4888 (Gg—216418); Engelmann s.n. [St. Louis, Sept. 1841] (W), s.n. [St. Louis] (S); F. E. McDonald s.n. [St. Louis, June 1886] (Ca—192066, Ur). ARKANSAS: Baxter Co.: Demaree 28939 (Au—122692, Hi—51456, N, Ok, We). Benton Co.: Heacox s.n. [July 20, '89] (Ob—50756). Carroll Co.: E. J. Palmer 44494 (W—1828079). Clark Co.: Demaree 17178 (N), 17808 (N). Craighead Co.: Demaree 27792 (N). Fulton Co.: Demaree 30805 (Au—122688, Le, St). Independence Co.: Demaree 26752 (Au—122689, Lb—47028, N, Ok, St). Izard Co.: F. W. Pennell 10698 (N); A. Robinson 1792 (Lw). Lawrence Co.: Demaree 26179 (N), 30447 (N); Rolfs s.n. [8/91] (Io—44894). Marion Co.: Demaree 29249 (Au—122687, Hi—51438, Mi, N, Ok, We), 47947 (Lw). Randolph Co.: Demaree 30955 (Le). Searcy Co.: R. Bebb 4027 (Ok, Ok). Sebastian Co.: Ayers s.n. [Fort Smith, 1880] (Mi). Sharp Co.: Demaree 26112a (Le), 26271 (N); D. B. Dunn 12814 (Lb—39845). Stone Co.: Demaree 27876 (Au—122686, N). Washington Co.: B. J. Turner s.n. [Summer 1939] (Au). County undetermined: F. L. Harvey s.n. [N. W. Ark.] (Ka). NEBRASKA: Banner Co.: Rydberg 154 (N). Lancaster Co.: J. L. Sheldon s.n. [Lincoln, August 20, 1902] (We). OKLAHOMA: Adair Co.: C. S. Wallis 2386 (St). Bryan Co.: C. S. Sheldon 49 (W). Cherokee Co.: R. Bebb 4371 (Ok, Ok); C. S. Wallis 440 (St), 535 (St), 720 (St). Choctaw Co.: Ripley & Barneby 7435 (N); Smith & Randel 69 (Ok); Waterfall 8901 (Ok).

Craig Co.: Waterfall 6852 (Ok). Delaware Co.: C. S. Wallis 2296 (St), 2440 (St), 3258 (St), 4199 (St). Harmon Co.: Demaree 12216 (Ok--22237). Leflore Co.: "R. E. J." s.n. [Winding Stair Mts., 7/3/19] (Ok--10262). Mayes Co.: Coryell 946 (St). McCurtain Co.: H. W. Houghton 3622 (N), 3646 (N); Little & Olmsted 104 (Ok--10263, Ok--10264). Murray Co.: D. C. Harper 52 (St--23058). Muskogee Co.: E. L. Little 1584 (Ok--10267), 1785 (Ok--10265), 2346 (Ok--10266). Osage Co.: G. W. Stevens A.1980 (St--9205); Van Vleet 434 (Ok--20509); Waterfall 8179 (Ok). Ottawa Co.: G. W. Stevens 2299 (N, Ur), A.2299 (St--9206). Payne Co.: Van Vleet 399, in part (Ok--20508), s.n. [Yale, 6-25-05] (Ok--10315). Pontotoc Co.: D. McCoy 605 (St), 2802 (St). Rogers Co.: Waterfall 1453 (Ok, St), 1469 (St). Wagoner Co.: R. Bebb 4324 (Ok). Washington Co.: G. W. Stevens A.2080 (St--9204). County undetermined: Burrill s.n. [Indian Territory] (H--106463). UNITED STATES: State undetermined: Rafinesque s.n. [13.1.41] (N); Torrey & Gray s.n. [Southern United States] (Br). CULTIVATED: Belgium: Herb. Hort. Brux. s.n. (Br); Herb. Jard. Bot. Brux. s.n. (Br); Lejeune s.n. [1822] (Br), s.n. [1836] (Br), s.n. (Br); M. Martens s.n. [1834] (Br), s.n. (Br). Czechoslovakia: M. Martens s.n. (Br). France: Herb. Decaisne s.n. [h. P. 1832] (Br, Br); Herb. W. H. Harvey s. n. [h. R. P., Aug. 1846] (Du--176520). Germany: Bouché s.n. [Herb. Prager 18638] (Gg--31456); Herb. Mus. Bot. Stockholm s.n. [herb. Hamb.] (S); Herb. Vigener s.n. [Botan. Garten Heidelberg] (La). Spain: Collector undesignated s.n. [1814] (Q); Herb. Hort. Reg. Matrit. 3 (Q), 42 (Q). Sweden: Herb. Mus. Bot. Stockholm s.n. (S); Wallberg s.n. [ex Hort. Proprio 1802] (Lu). Switzerland: Herb. Hort. Bot. Basil. s.n. [Aug. 1838] (C). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated s.n. [8/9] (Cn), s. n. (Pu, Pu); Herb. Coll. Pharmacy s.n. (Pa); Herb. Harvey s.n. (Du--166464); Herb. Mus. Bot. Stockholm s.n. (S); Herb. F. Philippi s.n. [Am. S.] (Sg--25560); Lesquereux 462 [N. Amer.] (Gg--31268); MacCallum s.n. [Bartlett Springs, Aug. 1905] (Gg--14486); Pitcher s.n. [1842] (T); J. Torrey s.n. (S); A. Wood s.n. (Pa). MOUNTED CLIPPINGS: Lehm., Nov. Act. K. Deut. Akad. Naturf. Halle 14 (2): 524. 1825 (W).

VERBENA SIMPLEX f. ALBIFLORA Moldenke, Résumé Suppl. 10: 1, nom. nud. 1964; Phytologia 10: 172. 1964.

Bibliography: Moldenke, Résumé Suppl. 10: 1. 1964; Moldenke, Phytologia 10: 172. 1964.

This form differs from the typical form of the species in having white corollas.

The type of the form was collected by Ronald Leighton McGregor (no. 13217) scattered in low places in shallow soil over limestone in native bluestem prairie hay meadow 2 miles south of Els-

more, Allen County, Kansas, on July 22, 1957, and is deposited in the herbarium of the University of Kansas at Lawrence. The form is known thus far only from the type specimen.

Citations: KANSAS: Allen Co.: R. L. McGregor 13217 (Lw—type).

VERBENA SIMPLEX var. EGGERTI Moldenke, Am. Midl. Nat. 24: 753. 1940.

Synonymy: Verbena simplex x hastata Gates, Fl. Kans. 190, in part. 1940. Verbena simplex eggerti Moldenke, Résumé Suppl. 7: 10, in syn. 1963.

Bibliography: F. C. Gates, Fl. Kans. 190. 1940; Moldenke, Am. Midl. Nat. 24: 753. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 9 & 102. 1942; Moldenke, Castanea 10: 38 & 39. 1945; Moldenke, Alph. List Cit. 1: 181 (1946) and 2: 405 & 587. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 17 & 199. 1949; Moldenke in Gleason, New Britton & Br. Illustr. Fl., pr. 1, 3: 131 (1952) and pr. 2, 3: 131. 1958; Moldenke, Résumé 21, 22, 374, & 474. 1959; Moldenke, Phytologia 8: 245. 1962; Moldenke, Résumé Suppl. 7: 2 & 10. 1963; Moldenke, Phytologia 10: 174. 1964.

This variety differs from the typical form of the species in being abundantly branched from the base, with up to 35 branches per plant, each terminating in an elongated densely many-flowered spike.

The type of the variety was collected by Heinrich Karl Daniel Eggert at Pacific, Franklin County, Missouri, on July 4, 1896, and is deposited in the Britton Herbarium at the New York Botanical Garden. The D. J. Johnson s.n., cited below, was regarded by Gates (1940) as V. simplex x hastata, but does not seem to me to represent that hybrid. On the other hand, the rather large, many-branched, many-spiked specimens cited by me under V. simplex may actually represent var. eggerti. Among them are Shacklette 609 (Ky) from Union County, Kentucky; Eggert s.n. [12 Aug. 1875] (Cm) from Saint Louis County, Missouri; Koenig s.n. [July 1878] (Cm) from Hampshire County, West Virginia; Ruth s.n. [Knoxville, June 1900] (Dt) from Knox County, Tennessee; and Guttenberg s.n. [Sept. 10, '79] (Cm) from Erie County, Pennsylvania. It is very probable that V. multicaulis Raf. also belongs here.

The variety has been misidentified in herbaria and distributed under the names V. angustifolia Michx. and V. simplex Lehm. It has been collected along railroad tracks and "in grassy open woods, level area 20 feet from creek", flowering in June and September, and fruiting in September. Hayden found it growing in proximity to xV. moechina Moldenke and says that compared to the latter "this material seems to be typical Verbena angustifolia." The Gleason 8845 collection appears to be a mixture with typical V. simplex.

In all, besides the specimens mentioned above, 6 herbarium specimens, including the types of all the names involved, and one mounted clipping have been examined by me.

Citations: IOWA: Cerro Gordo Co.: A. Hayden 2 (N, N). KENTUCKY: Bell Co.: H. A. Gleason 8845, in part (N). KANSAS: Butler Co.: D. J. Johnson s.n. [August 1926] (Ka--71717). MISSOURI: Franklin Co.: Eggert s.n. [Pacific, 4 July 1896] (Ca--183208--isotype, N--type). MOUNTED CLIPPINGS: Moldenke, Am. Midl. Nat. 24: 753. 1940 (W).

xVERBENA SOLBRIGII Moldenke, Phytologia 7: 85. 1959.

Synonymy: Glandularia laciniata x peruviana Schnack & Solbrig, Revist. Fac. Agron. La Plata 29: 255--266, fig. 1--4. 1953.

Bibliography: Schnack & Solbrig, Revist. Fac. Agron. La Plata 29: 255--266, fig. 1--4. 1953; Moldenke, Phytologia 7: 85. 1959; Moldenke, Résumé Suppl. 1: 15, 18, 23, & 25. 1959; Moldenke, Phytologia 8: 121. 1961.

Illustrations: Schnack & Solbrig, Revist. Fac. Agron. La Plata 29: 255--266, fig. 1--4. 1953.

This is the hybrid between Verbena tenuisecta Briq. and V. peruviana (L.) Britton, produced artificially in Argentina in 1951. The original statement about its origin is "El híbrido Glandularia laciniata x G. peruviana fué obtenido por ono de nosotros en el Instituto Fitotécnico de Santa Catalina [Zárata, prov. Buenos Aires] en el año 1951; posteriormente se obturo el correspondiente anfidiploide por tratamiento con colchicina."

The two parental species occur together in the wild in at least one state of Brazil, in Paraguay, Uruguay, and nine provinces of Argentina, so the hybrid is likely to be encountered there. It should have considerable horticultural merit, since both parental species are extremely showy.

VERBENA SPECTABILIS Moldenke, Phytologia 2: 426--427. 1948.

Bibliography: Moldenke, Phytologia 2: 426--427. 1948; Moldenke, Castanea 13: 119. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 107 & 199. 1949; Moldenke, Alph. List Cit. 4: 1256. 1949; Moldenke, Phytologia 3: 306. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 128 & 474. 1959; Moldenke, Résumé Suppl. 1: 7. 1959.

Herb, to 50 cm. tall; stems rather short, obtusely tetragonal, mostly branched at or near the base, rather densely short-pubescent with reflexed brownish hairs; branches slender, erect or ascending, rather obtusely tetragonal, usually sulcate between the angles, densely short-pubescent with reflexed sordid-gray hairs; nodes annulate; principal internodes 2--4 cm. long; leaves decussate-opposite; petioles very short or usually obsolete; leaf-blades chartaceous, rather uniformly green on both surfaces, ovate, 2.5--4 cm. long, 0.8--2 cm. wide, acute at the apex, acuminately narrowed into the broadly winged petiole at the base, irregularly dentate or occasionally subincised from the apex to the widest point, the lowest teeth sometimes lobe-like and divergent on larger leaves, rather densely appressed-strigose above, appressed short-pubescent beneath; midrib and the 5--8 pairs of

secondaries very slender, usually impressed above, prominulous beneath, the secondaries rather straight, ascending, branching at the apex and a branch extending to the tip of each tooth; inflorescence terminal and in the uppermost leaf-axils, congested-spicate, the floriferous portion 2.5--3.5 cm. long, densely many-flowered, apparently not elongating after anthesis; peduncles slender, 3--6.5 cm. long, densely short-pubescent with reflexed whitish hairs, often joined at about the midpoint and there bearing a pair of lanceolate bracts 7--8 mm. long; floral bractlets lanceolate, about 4 mm. long, about 1 mm. wide at the base (or narrower), attenuate at the apex, closely appressed to the calyx, densely short-pubescent with spreading whitish hairs; calyx cylindric, about 9 mm. long, 5-costate, densely short-pubescent with spreading whitish hairs, its rim unequally aristate-toothed, purplish, the longer appendages about 1 mm. long, often twisted-connivent before and after anthesis; corolla hypocrateriform, violet or purple, showy, its tube 10--15 mm. long, rather densely puberulent above the calyx on the outside, the limb about 9 mm. wide.

The type of this handsome species was collected by Erik Leonard Ekman (no. 1980) along a small stream called Magdalena at Loreto, Posadas, Misiones, Argentina, on February 6, 1908, and is deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm. The species has also been found on low ground and on campos along the edge of rivers, flowering in February and July.

In all, 8 herbarium specimens, including the type, and 4 mounted photographs have been examined by me.

Citations: ARGENTINA: Chaco: T. Rojas 11785 (N, S). Corrientes: Pedersen 4484 (Hi--193799, N, S, W--2283422). Misiones: Ekman 1980 (F--photo of type, N--isotype, N--photo of type, S--type, Si--photo of type, Z--photo of type).

VERBENA SPHAEROCARPA Perry, Ann. Mo. Bot. Gard. 20: 256--257. 1933.

Bibliography: I. M. Johnston, Proc. Calif. Acad. Sci., ser. 4, 20: 88. 1931; Perry, Ann. Mo. Bot. Gard. 20: 243, 249, 250, 252, 256--257, & 356. 1933; A. W. Hill, Ind. Kew. Suppl. 9: 295. 1938; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 19 & 102. 1942; Moldenke, Alph. List Cit. 1: 30 (1946) and 2: 469. 1948; Moldenke, Castanea 13: 114. 1948; Moldenke, Alph. List Cit. 3: 712, 800, & 951 (1949) and 4: 1166, 1224, & 1229. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 33, 34, & 199. 1949; Moldenke, Résumé 40 & 474. 1959; Moldenke, Phytologia 8: 257 & 406 (1962), 8: 463 (1963), and 9: 194. 1964.

Annual or biennial herb, to 1 m. tall; stems erect, tetragonal, branched above, glabrous or sparsely scabrous-pubescent; petioles short; leaf-blades oblong, 3--10 cm. long, acute at the apex, tapering into the petiole at the base, sharply serrate along the margins or the upper ones often entire, scabrous-pubescent above with the hairs minutely bulbous-based, more or less short-strigillose on both surfaces, prominently venose beneath; peduncles to

9 cm. long; spikes sometimes short and dense, subsessile or short-pedunculate, or to 4 cm. long, cymosely arranged; bractlets ovate-lanceolate, shorter than the calyx, acute at the apex, pubescent; calyx scarcely 2 mm. long, connivent over the schizocarp, appressed-pubescent, the teeth very short, subacute at the apex; corolla hypocrateriform, light-pink or bluish-white, its tube protruding slightly beyond the calyx, the limb 1.5--2 mm. wide; schizocarp about 1 mm. long and 1 mm. wide; cocci very faintly striate or essentially smooth, the commissural faces muricately scabrous.

The type of this strange endemic species was collected by Alfred Webster Anthony (no. 380) on Socorro Island, Colima, Mexico, between March and June, 1897, and is deposited in the herbarium of the Missouri Botanical Garden at St. Louis. The species has been found on rocky soil, flowering and fruiting from May to July. Material has been misidentified and distributed in herbaria as V. bonariensis L. and V. litoralis H.B.K.

Reid Moran, in a letter to me dated September 13, 1959, says "My specimens differ from Perry's description in having longer spikes, sometimes to 4 cm. long, borne on peduncles as long as 9 cm. According to my notes the corollas were light pink, though Mason, as quoted by Johnston.....said bluish-white."

Perry (1933) cites the following 4 additional specimens not as yet seen by me: REVILLAGIGEDO ISLANDS: Socorro: A. W. Anthony 380 (E--type, G--isotype); Barkelew 231 (E, G). She says "This endemic from Socorro Island is most nearly related to V. litoralis and has a similar habit, but is easily separated on the distinctive characters of the inflorescence. The spikes are shorter and denser, the flowers are smaller and so crowded that the lower ones appear to be inserted at right angles to the rachis of the spike; moreover, the schizocarp is fully as broad as or even broader than long, an unusual trait not found elsewhere in the North American species of Verbena."

In all, 16 herbarium specimens, including the type collection, have been examined by me.

Citations: REVILLAGIGEDO ISLANDS: Socorro: A. W. Anthony 380 (Ca--104821--isotype, Du--9550--isotype, W--313934--isotype); Barkelew 231 (Ca--138828, Du--90887, Du--91163, N, Po--64645, W--399024); H. L. Mason 1612 (Gg--186593, W--1569662); Patiño 7138 (Me); O. Solís 20 (Me, W--1265394), 70 (W--1268885), s.n. [9 Mayo 1925] (Me).

VERBENA STACHYS Raimondi, Bol. Mus. Hist. Nat. Jav. Prado 7: 242, hyponym. 1943.

Bibliography: Raimondi, Bol. Mus. Hist. Nat. Jav. Prado 7: 242. 1943; Moldenke, Castanea 10: 41. 1945; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 74 & 199. 1949; Moldenke, Résumé 85 & 474. 1959.

Nothing is known to me of this plant except that the type is an unnumbered collection made by Antonio Raimondi at Chanchamayo,

in the province of Tarma, Junín, Peru, in 1855.

VERBENA STELLARIOIDES Cham., Linnaea 7: 264—265. 1832.

Synonymy: Verbena stellarioides α decurrens Cham., Linnaea 7: 265. 1832. Verbena morongii Britton, Ann. N. Y. Acad. Sci. 7: 198. 1893. Verbena decurrens (Cham.) Kuntze, Rev. Gen. Pl. 3 (2): 257. 1898 [not V. decurrens Moench, 1947]. Verbena stellarioides var. decurrens Cham. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Glandularia stellarioides (Cham.) Schnack & Covas, Bol. Soc. Argent. Bot. 1: 284. 1946.

Bibliography: Cham., Linnaea 7: 264--265. 1832; Steud., Nom. Bot., ed. 2, 2: 750. 1841; D. Dietr., Syn. Pl. 3: 602. 1843; Walp., Repert. 4: 26. 1845; Schau. in A. DC., Prodr. 11: 540—541. 1847; Schau. in Mart., Fl. Bras. 9: 186. 1851; Morong, Britton, & Vail, Ann. N. Y. Acad. Sci. 7: 192 & 198. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Kuntze, Rev. Gen. Pl. 3 (2): 257. 1898; Durand & Jacks., Ind. Kew. Suppl. 1: 451. 1906; Herter, Florula Urug. 105. 1930; Herter, Revist. Sudam. Bot. 4: 186--187. 1937; Moldenke, Prelim. Alph. List Invalid Names 47. 1940; Moldenke, Suppl. List Invalid Names 10. 1941; Moldenke, Alph. List Invalid Names 49 & 50. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 39, 41, & 102. 1942; Schnack & Covas, Bol. Soc. Argent. Bot. 1: 284. 1946; Troncoso & Burkart, Darwiniana 7: 211, fig. 2a, 214, & 215. 1946; Augusto, Fl. Rio Grande do Sul 209 & 232. 1946; Moldenke, Alph. List Cit. 1: 201 & 263. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 10 & 23. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 73. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94, 99, & 199. 1949; Moldenke, Alph. List Cit. 3: 688 & 923. 1949; Moldenke, Phytologia 3: 289 & 378. 1950; Schnack & Covas, Revist. Argent. Agron. 18: 107—108, fig. 1 A—F. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 101. 1953; Moldenke, Résumé 111, 118, 120, 128, 296, 363, 370, 374, & 474. 1959; Moldenke, Résumé Suppl. 2: 13 (1960) and 7: 6. 1963; Moldenke, Phytologia 9: 130 (1963), 10: 159 & 160 (1964), and 11: 141 & 142. 1964.

Illustrations: Troncoso & Burkart, Darwiniana 7: 211, fig. 2a. 1946; Schnack & Covas, Revist. Argent. Agron. 18: 107--108, fig. 1 A—F. 1951.

Suffrutescent perennial herb, with the habit of Stellaria holostea; rhizomes creeping:stems herbaceous, erect, 40 cm. to 1 m. tall, slender, tetragonal, varying from simple to branched, sharply margined, glabrous; branches elongate, fastigiate; terminal internode subvillous; leaves decurrent, erect-patulous, linear, narrowed to an acute apex, entire, 1-nerved, glabrous, the margins reflexed; spikes terminal, congested, at first fastigiate, later elongate and finally cylindric, solitary and simple or a few crowded together; bractlets lanceolate, colored, about 1 cm. long, surpassing the calyx, subulate-acuminate at the apex, villous-ciliate; flowers large, odorless; calyx membranous, colored, tubular, about 6 mm. long, 5-ribbed, villous on the angles, the

teeth 5, subulate-aristate, ascending, the 2 lower ones larger, the 2 lateral ones somewhat shorter, the uppermost one short; corolla large, hypocrateriform, varying from lilac, purple or violet to blue-violet, blue-purple, or blue, villous-lanuginous on the outer surface, its tube about 12 mm. long, twice as long as the calyx-tube, ampliate above, villous within, the limb almost 1 cm. wide, spotted in the throat, 5-parted; stamens 4, didynamous, inserted slightly below the mouth of the corolla-tube; filaments short; anthers cordate-ovate; style setaceous or capillary, equaling the stamens, elongate and exserted from the calyx after the falling of the corolla, clavate-incrassate at the apex; stigma subapical, with an adjacent, minute, oblique, acute horn; fruiting-spikes about 5 cm. long, cylindric, lax at the base; fruit oblong, about 4 mm. long, slightly thickened at the base; cocci linear, obtuse, convex and elegantly areolate on the back, the areoles quadrangular, the commissural surface angulate, smooth; chromosome number: x = 5.

The type of this species was collected by Friedrich Sellow in grassy campos at Rio Jacuy near Banhado, Rio Grande do Sul, Brazil, and was deposited in the herbarium of the Botanisches Museum at Berlin before World War II, now destroyed, but fortunately represented by Macbride's type photograph no. 17446. I regard this photographed specimen also as the type of var. decurrens, the typical variety. I follow Schauer in regarding var. decurrens as a synonym of the typical form of the species. The so-called var. sessilis Cham. I regard as V. sessilis (Cham.) Kuntze. The two species are not very clearly defined, but, in general, V. stellarioides has the leaves decurrent, linear, entire, and glabrous (or strigose on the margins only), and the bractlets longer than the calyx, while in V. sessilis the leaves are merely sessile, narrow-lanceolate, obsoletely serrate, and sparsely strigillose, and the bractlets are shorter than the calyx. The bractlet length seems, however, to be the only reliable character.

The type of V. morongii was collected by Thomas Morong (no. 600) -- in whose honor it is named -- along railroad tracks at Caballero, Paraguay, on January 20, 1889, and is deposited in the Columbia University herbarium at the New York Botanical Garden. Verbena morongii was regarded as conspecific with V. sessilis by me in my 1940 publication.

Verbena stellarioides has been found in swamps and open places, fields and moist grassy fields, in foggy places, on low or wet campos, among palms, along railroad tracks, and on grasslands on low occasionally flooded ground, flowering and fruiting from October to January and in April and May. Schulz reports it as rather abundant at Colonia Benítez in Chaco, while Jörgensen says that it is also common in open places in Paraguay.

Walpers (1845) classifies this species in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Macranthae, and Secondary Subgroup Melindres, along with ten other species. It should

be noted here that the V. decurrens of Moench is a synonym of Stachytarpheta jamaicensis (L.) Vahl. While this binomial is accredited to Moench, actually Verbena is mentioned by him in his Meth. (1794) only on pages 368, 369, & 423 and no such binomial is mentioned there. In his Suppl. Meth. Pl. the genus is mentioned on pages 131, 150, & 327 (1802) and no such binomial occurs there, either; however, on page 150 he describes a Vermicularia decurrens as a new name for Stachytarpheta jamaicensis. "Verbena decurrens" is given in Kuntze, Rev. Gen. Pl. 3 (2): 257 (1898) with "(Cham.)" implied. The Morong, Britton, & Vail reference in the bibliography above is often credited to Britton alone and erroneously dated "1892".

Troncoso & Burkart (1946) say: "V. stellarioides posee espigas terminales solitarias, rara vez hasta 2 ó 3 espigas por vástago... inflorescencia capituliforme durante la antesis; intermodio terminal (debajo de la espiga) visiblemente velloso; flores mucho mayores [as compared to V. tristachya], con limbo amplio y extendido, tubo corolar exteriormente velloso-lanuginoso; brácteas muy subuladas, más largas que el cáliz, velloso-ciliadas; cáliz velloso en los ángulos.....V. stellarioides posee también tallo completamente fistuloso, aunque de cavidad menor....el estilo..... en V. stellarioides es 10 veces y media mayor (que el ovario)."

Material of V. stellarioides has been misidentified and distributed in herbaria under the names V. littoralis Kunth, V. sessilis Kuntze, and V. stellarioides sessilis Cham., while Rojas 1680 was called "V. stellarioides Cham. sensu lato" by Hassler.

Schauer (1847, 1851) gives V. montevidensis Spreng. as a synonym of V. stellarioides with a question and the qualifying remark "ex diagnosi", but Sprengel's name actually applies to a very different species, which see. Schauer says of V. stellarioides "Planta conspicua, facie Stellariae Holosteae haud omnino dissimilis, sed firmior." Chamisso (1832) says "cyma hac lege ter dichotoma inter multa unispicata specimina occurrit; nex omnino desunt trifurcationis specimina". Of the spikes he says "casu truncati ramis axillaribus sui similibus renovati, sic ramis oppositis bifurci; bifurci etiam rarius ex inflorescentia, ramis e summorum foliorum axillis evolutis foliosis spiciferis spicam primariam alarem comitantibus" and of the cocci he notes "color illi griseus pallide nigrescens. Carpello dorso octonervia, facie bus albidis nudiusculis, angulo faciale nervoso."

Schnack & Covas (1951) studied the chromosome complement of this species and of V. tristachya Troncoso & Burkart and report "En G. stellarioides, sobre la unica planta obtenida de semillas coleccionadas por el Ing. L. B. Mazoti en Ituzaingo (provincia de Corrientes), hemos costatado en microsporocitos y en celulas somaticas 5 pares de cromosomas y un fragmento centrico libre.... En todas las metafases mitoticas observadas esta presente el fragmento, lo que indica que se divide en cada mitosis. En el

proceso meiotico se observo que el fragmento pasa a formar parte de unto de los nucleos hijos derivados de la primera division meiotica; no hemos observado los resultados de la segunda division meiotica, pero es presumible que en ella el fragmento se divide ecuacionalmente. En un caso se verifico en prometafase I la presencia de 4 bivalentes, 2 monovalentes y un fragmento....De cualquier modo, para el proposito de esta comunicacion lo importante es que G. stellarioides posee el numero basico de cromosomas x = 5. En resumen, los numeros cromosomicos observados confirman la ubicacion de ambas especies en genero Glandularia y refirman la validez de dicho genero."

Augusto (1946) also cites a Herter collection from Cerro Largo, Uruguay, not as yet seen by me. In all, 28 herbarium specimens and 6 mounted illustrations, including type or phototype material of all the names involved, have been examined by me.

Citations: BRAZIL: Rio Grande do Sul: Jürgens 22 (B); Rambo 10156 (Rb); Schreiner s.n. (Ja--46575, N); Sellow s.n. [Macbride photos 17446] (Kr--photo of type, N--photo of type, N--photo of type). PARAGUAY: Jörgensen 3773 [Herb. Osten 22241] (Cp, Du--197836, N, N--photo, N--photo, S, Ug, W--1483812, Z--photo); Kuntze s.n. [Nord Paraguay, Sept. 1892] (N); Morong 600 (C); Pedersen 4262 (W--2283742); Rojas 1680 [Herb. Hassler 1680; Herb. Osten 8641] (N, Ug), 2527 [Herb. Osten 18184] (N, Ug). URUGUAY: Arechavaleta 18 (N, Ug, Ug, Ug), 36 (Ug), s.n. [Tacuarembó, Nov. 1903] (Ug); Cantera s.n. [Arechavaleta 18a] (Ug). ARGENTINA: Chaco: A. G. Schulz 285 [Herb. Osten 23149] (N, Ug), 1468 (It, N).

VERBENA STEWARTII Moldenke, Phytologia 2: 56--57. 1941.

Bibliography: Moldenke, Phytologia 2: 56--57. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 34 & 102. 1942; Moldenke, Castanea 13: 116. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 84. 1948; Moldenke, Alph. List Cit. 3: 972. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 71 & 199. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 81 & 474. 1959.

Herb, more or less nigrescent in drying; stems and branches very slender, the latter almost filiform, sharply tetragonal, glabrous and shiny throughout; nodes annulate; principal internodes mostly elongated, 2--6 cm. long; leaves decussate-opposite, sessile, the upper ones linear, the lower ones with 2 or 3 linear widely divergent lobes, revolute-margined, blunt-pointed, more or less sparsely scattered-pilose with appressed whitish antrorse hairs on both surfaces; midrib prominent beneath; inflorescence terminal, spicate, rather few-flowered, dense toward the apex and during anthesis, the lower flowers often scattered after anthesis; peduncles slender, elongated, 6.5--7.5 cm. long, glabrous and shiny; rachis filiform, glabrous and shiny or very obscurely scattered-pulverulent; bractlets lanceolate, 1.5--2 mm. long, acuminate at the apex, glabrous except for the ciliolate margins; calyx tubular, about 2 mm. long, minutely appressed-puberulent;

corolla hypocrateriform, barely exceeding the calyx, its tube usually only about 2 mm. long, the limb about 1.5 mm. wide.

The type of this remarkable species was collected by Alban Stewart (no. 3320) -- in whose honor it is named -- at Tagus Cove, Albemarle Island, Galapagos Islands, on March 27, 1906, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collector states that the species is common in lava beds at 300 feet altitude. It has been misidentified and distributed in herbaria as V. litoralis H.B.K., while the Bishop Museum isotype is actually mounted on the same herbarium sheet as Stewart 3319, which is V. galapagosensis Moldenke.

Verbena stewartii has been found in flower and fruit in March. In all, 3 herbarium specimens, including the type, and 4 mounted photographs have been examined by me.

Citations: GALAPAGOS ISLANDS: Albemarle: A. Stewart 3320 (Bi--isotype, F--photo of isotype, Gg--31381--isotype, N--type, N--photo of isotype, Si--photo of isotype, Z--photo of isotype).

VERBENA STOREOCLADA Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1060--1061. 1904.

Synonymy: Verbena erinoides Chod. (in part) ex Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1060, in syn. 1904 [not V. erinoides Auth., 1959, nor Hook., 1934, nor Hook. & Arn., 1959, nor H.B.K., 1963, nor Lam., 1791, nor L. ex Lorentz & Niederlein, 1881, nor L. ex Walp., 1843, nor Poepp., 1847, nor Spreng., 1830, nor Willd., 1947]. Verbena crinoides Chod. (in part) ex Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1059 & 1060, in syn. 1904. Verbena stereoclada Briq. ex Angely, Fl. Paran. 16: 79, sphalm. 1960. Verbena humilis Cham. ex Moldenke, Résumé Suppl. 7: 9, in syn. 1963.

Bibliography: Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1059--1061. 1904; Briq. in Chod. & Hassler, Plant. Hassler. 10: 482. 1904; Prain, Ind. Kew. Suppl. 3: 187. 1908; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 41 & 102. 1942; Moldenke, Alph. List Cit. 1: 263. 1946; Moldenke, Phytologia 2: 337 & 386. 1947; Moldenke, Castanea 13: 117. 1948; Moldenke, Alph. List Cit. 3: 693, 704, & 766 (1949) and 4: 1080 & 1172. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94, 99, 100, 107, & 109. 1949; Moldenke, Phytologia 3: 289. 1950; Stellfeld, Trib. Farmac. 19 (10): 167. 1951; Angely, Fl. Paran. 7: 13. 1957; Moldenke, Résumé 111, 118, 120, 128, 363, & 474. 1959; Angely, Fl. Paran. 16: 79 (1960) and 17: 47. 1961; Moldenke, Résumé Suppl. 3: 41. 1962; Moldenke, Phytologia 8: 202, 417, & 420 (1962) and 9: 12, 67, & 70. 1963; Moldenke, Résumé Suppl. 7: 9. 1963; Moldenke, Phytologia 9: 388 & 393. 1964.

Herb. 20--40 cm. tall; stems many from a single root, rather weak, procumbent, somewhat angled, branched; branches divergent-ascending, green, sparsely retrorsely pubescent; middle internodes 2--6 cm. long; petioles to 1 cm. long, winged, often ap-

pearing falsely pinnate-auriculate because of smaller axillary leaves at their base; leaf-blades green on both surfaces, ovate in outline, 3--4 cm. long, 1.5--2 cm. wide, obtuse or subobtuse at the apex, broadly cuneately decurrent into the short petiole at the base, pinnately lobed with the lobes obtusely crenate-serrate, often rather wide, sparsely antrorsely substrigose-pubescent above, glabrescent beneath except for the prominulous veins; inflorescence spicate, more or less pedunculate; peduncles slender; spikes terminal, finally elongate to 4 cm., congested; bractlets lanceolate, about 5 mm. long, shorter than the calyx, sparsely pubescent on the back, ciliate-pubescent along the margins, spreading after anthesis; calyx tubular, about 7 mm. long, densely pilose with short spreading or slightly ascending hairs, urceolate after anthesis, the tube about 5 mm. long, the mouth oblique, the teeth setaceous, unequal, the 2 anterior ones longer, about 2 mm. long, the rest 1--1.5 mm. long, all finally connivent; corolla hypocrateriform, rose or violet, surpassing the calyx-teeth by 1--2 mm., puberulent on the outside, its tube regular, cylindric, somewhat exserted, the limb spreading, 5--6 mm. wide, the lobes obcordate, the larger ones about 2 mm. long and 3 mm. wide, emarginate to 1 mm. at the apex; stamens and pistil normal for the genus; style exserted after anthesis; cocci sublinear-oblong, about 2.5 mm. long and 0.7 mm. wide, raised-reticulate on the back, finally foveolate and brown.

The type of this species was collected by Emil Hassler (no. 4489) in fields near Rio Corrientes, Paraguay, in September, deposited in the Delessert Herbarium at the Conservatoire et Jardin Botaniques at Geneva. Briquet comments that "Cette espèce est très voisine de la précédente [V. calliantha]. Elle s'en distingue cependant par ses tiges et rameaux procombants plus grêles, par sa tige couverte de poils défléchis et non pas étalés-ascendants, par la forme de l'indument des feuilles, par ses bractées relativement plus longues, par son calice plus court et par sa corolla plus petite à tube à peine exsert."

The name, V. humilis, seems to be based on Malme 1322 from sandy rather wet fields at Cachoeira, Rio Grande do Sul, Brazil, collected on February 2, 1902, and deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm.

It should be noted here that V. erinoides and V. crinoides of Chodat are also in part V. calliantha Briq.; the V. erinoides of "Auth." is V. dissecta Willd., that of Humboldt, Bonpland, & Kunth is V. ciliata Benth., that of Linnaeus [ex Walpers] and of Lamarck is V. laciniata (L.) Briq., that of Willdenow is V. laciniata var. contracta (Lindl.) Moldenke, and that of Hooker, of Hooker & Arnott, of Poeppig, of Sprengel, and of Linnaeus [ex Lorentz & Niederlein] is V. berterii (Meisn.) Schau. Macbride's photograph no. 24698, cited below, is of a specimen depoisted in the Delessert Herbarium at Geneva.

Verbena storeoclada has been found in fields and in sandy

rather wet fields, at altitudes of 1100 to 1200 meters, flowering from January to March and in June and September. In all, 12 herbarium specimens, including type material of all the names involved, and 2 mounted photographs have been examined by me.

Citations: BRAZIL: Paraná: Tessmann 3701 [Herb. Mus. Paran. 3701] (N). Rio Grande do Sul: Malme 1322 (S); J. Vidal s.n. [near city of Torres, Feb. 1939; Herb. Mus. Nac. Rio de Jan. 46544] (N), s.n. [Bocca do Monte, March 1939] (Ja--46546). Santa Catarina: Smith & Reitz 10193 (W--2251660, Z). PARAGUAY: Hassler 4489 [Macbride photos 24698] (Ca--935083--isotype, Kr--photo of type, N--isotype, N--photo of type). URUGUAY: Née 84 (N, Q). ARGENTINA: Santiago del Estero: H. H. Bartlett 20452 (Mi, W--1907605).

VERBENA STRICTA Vent., Descr. Pl. Jard. Cels. 53, pl. 53. 1800.

Synonymy: Verbena alopecurus Cav., Descr. 68. 1802. Verbena rigens Michx., Fl. Bor.-Am., ed. 1, 2: 14. 1803. Verbena foliis ovato-oblongis, crenato-serratis ramisque pilosis Vahl apud Poir. in Lam., Encycl. Méth. Bot. 8: 549, in syn. 1808. Verbena (rigens), caulibus rigidè erectis; foliis obovalibus, subtomentoso-hirsutissimis; spicis imbricatis Michx. apud Poir. in Lam., Encycl. Méth. Bot. 8: 549, in syn. 1808. Verbena (stricta), hirsuta, albicans, spicis cylindraceis; foliis subsessilibus, ovatis, serratis; caulibus strictis, teretibus Vent. apud Poir. in Lam., Encycl. Méth. Bot. 8: 549, in syn. 1808. Verbena cuneifolia Raf., Med. Repos. N. Y., ser. 2, 5: 360. 1808; Journ. Bot. [Paris] 1: 228. 1809. Verbena ringens Raf., First Cat. Bot. Gard. Transylv. Univ. 16, nom. nud. 1824; Herb. Raf. 61, nom. nud. 1833. Verbena stricta β mollis Torr., Ann. Lyc. N. Y. 2: 234. 1827. Verbena mollis Raf., Atl. Journ. 1: 146. 1832. Verbena scoparia Tausch, Flora 19: 390. 1836 [not V. scoparia Gill. & Hook., 1829, nor Hook., 1947]. Verbena stricta var. mollis Torr. ex Eaton & Wright, N. Am. Bot., ed. 8, 470. 1840. Verbena alopecuroides Hort. ex Steud., Nom. Bot., ed. 2, 2: 749, in syn. 1841. Verbena alopecurioides Hort. ex Steud., Nom. Bot., ed. 2, 2: 750, in syn. 1841. Verbena striata Vent. ex K. V. O. Dahlgren, Bot. Notiser Lund 1923: 10, sphalm. 1923. Verbena stricta L. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena stricta Michx. ex Moldenke, Alph. List Invalid Names 50, in syn. 1942. Verbena strica Vent. ex G. L. Fisher, Am. Bot. Exchange List, sphalm. 1946. Verbena rugosa Michx. ex Moldenke, Alph. List Invalid Names Suppl. 1: 26, in syn. 1947 [not V. rugosa D. Don, 1836, nor Mill., 1768, nor Muhl., 1809, nor Sweet, 1845]. Verbena stricata Vent. ex Moldenke, Alph. List Invalid Names Suppl. 1: 26, in syn. 1947. Verbena stricta x hastata Gates (in part) ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947. Verbena strieta Vent. ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947.

Verbenia stricta Vent. ex Moldenke, Alph. List Invalid Names Suppl. 1: 28, in syn. 1947. Verbena quintus Barkley, Nat. Mag. 50: [309], in jest. 1957. Veebena stricta Vent. ex Moldenke, Résumé Suppl. 2: 10, in syn. 1960. Verbena stricta Benth. ex Moldenke, Résumé Suppl. 3: 41, in syn. 1962. Verbena stricta Willd. ex Moldenke, Résumé Suppl. 3: 41, in syn. 1962. Verbena stricta f. stricta Wallis ex Moldenke, Résumé Suppl. 3: 41, in syn. 1962; Steyerm., Fl. Mo. 1260. 1963. Verbena hastata stricta Rydb. ex Moldenke, Résumé Suppl. 5: 10, in syn. 1962. Verbena structa Vent., in herb.

Bibliography: Vent., Descr. Pl. Jard. Cels. 53, pl. 53. 1800; Cav., Descr. 68. 1802; Michx., Fl. Bor.-Am., ed. 1, 2: 14. 1803; Vahl, Enum. Pl. 1: 207. 1804; Raf., Med. Repos. N. Y., ser. 2, 5: 360. 1808; Poir. in Lam., Encycl. Méth. Bot. 8: 549. 1808; Raf., Journ. Bot. [Paris] 1: 228. 1809; Mirbel, Ann. Mus. Hist. Nat. Paris 15: 260, pl. 14 (2), fig. 1. 1810; Dum. Cours., Bot. Cult., ed. 2, 2: 625--626. 1811; Pursh, Fl. Am. Sept. 2: 417. 1814; J. Sm. in Rees, Cycl. 36: no. 17. 1817; Sims in Curtis, Bot. Mag. 45: pl. 1976. 1818; Michx., Fl. Bor.-Am., ed. 2, 1 [=2]: 14. 1820; Steud., Nom. Bot., ed. 1, 874. 1821; Raf., First Cat. Bot. Gard. Transylv. Univ. 16. 1824; Spreng. in L., Syst. Veg., ed. 16, 2: 749. 1825; J. Torr., Ann. Lyc. N. Y. 2: 234. 1827; Sweet, Hort. Brit., ed. 2, 418. 1830; Raf., Atl. Journ. 1: 146. 1832; Raf., Herb. Raf. 61. 1833; Hook., Comp. Bot. Mag. 1: 176. 1836; Eaton & Wright, N. Am. Bot., ed. 8, 470. 1840; Steud., Nom. Bot., ed. 2, 2: 749 & 750. 1841; D. Dietr., Syn. Pl. 3: 602. 1843; Walp., Repert. 4: 23 & 33. 1845; Schau. in A. DC., Prodr. 11: 547 & 555. 1847; A. Gray, Syn. Fl. N. Am. 2 (1): 336. 1878; Pickering, Chron. Hist. Pl. 1044 & 1220. 1879; A. W. Chapm., Fl. South. U. S., ed. 2, 636. 1889; Wats. & Coult. in A. Gray, Man., ed. 6, 402. 1890; A. S. Hitchc., Trans. St. Louis Acad. Sci. 5: 512. 1891; Coult., Contrib. U. S. Nat. Herb. 2: 327. 1892; F. D. Bergen, Journ. Am. Folk-lore 5: 102. 1892; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 148. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1178 & 1179. 1895; L. H. Bailey in A. Gray, Field Forest & Gard. Bot. 341. 1895; Hitchc. & Norton, Bull. Kans. Agric. Sta. 50: 54, pl. 6, fig. 91 (1895), 57: pl. 13, fig. 138 (1896), and 66: pl. 12, fig. 138. 1897; A. W. Chapm., Fl. South. U. S., ed. 3, 368. 1897; Hitchc. & Norton, Bull. Kans. Agric. Sta. 76: pl. 9, fig. 47. 1898; Britton & Br., Illustr. Fl., ed. 1, 3: 71, fig. 3061. 1898; A. S. Hitchc., Fl. Kans. pl. 14. 1899; N. L. Britton, Man. 778. 1900; J. K. Small, Fl. Southeast. U. S., ed. 1, 1009. 1903; Michx., Travels West Alleg., ed. Thwaite, 67. 1904; Robinson & Fern. in A. Gray, New Man. Bot., ed. 7, 689 & 924. 1908; M. A. Day, Check List 128. 1908; L. H. Pammel, Weeds Farm. & Gard. 218. 1911; Beal, Mich. Weeds [Bull. Mich. Agric. Exp. Sta. 267:] 396. 1911; Gerth van Wijk, Dict. Plantnames 1: 1398. 1911; Blewitt, Rhodora 13: 89. 1911; L. H. Bailey, Botany 372. 1911; Beal, Ann. Rep. Mich. Agric. Exp. Sta. 25: 385. 1912; Iowa Geol. Surv. Bull. 4: 265 & 469. 1913; Britton & Br., Illustr. Fl., ed. 2, 3:

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Illustrations: Vent., Descr. Pl. Jard. Cels. pl. 53. 1800; Mirbel, Ann. Mus. Hist. Nat. Paris 15: pl. 14 (2), fig. 1. 1810; Sims in Curtis, Bot. Mag. 45: pl. 1976 [in color]. 1818; Hitchc. & Norton, Bull. Kans. Agric. Sta. 50: pl. 6, fig. 91 (1895), 57: pl. 13, fig. 138 (1896), 66: pl. 12, fig. 138 (1897), and 76: pl. 9, fig. 47. 1898; Britton & Br., Illustr. Fl., ed. 1, 3: fig. 3061. 1898; L. H. Pammel, Weeds Farm & Gard. 218. 1911; Beal, Mich. Weeds [Bull. Mich. Agric. Exp. Sta. 267:] 396. 1911; Beal, Ann. Rep. Mich. Agric. Exp. Sta. 25: 385. 1912; Iowa Geol. Surv. Bull. 4: 265 & 469. 1913; Britton & Br., Illustr. Fl., ed. 2, 3: fig. 3556. 1913; Kanda, Bot. Gaz. 69: 66, fig. 61, 67, fig. 72, 70, fig. 42 & 45, & pl. 6, fig. 3. 1920; Dermen, Cytologia 7: 163, fig. 16. 1936; Gates, Weeds Kans. 91, fig. 19, pl. 6, fig. 91. 1941; Seed Trade Buyers Guide 86. 1945; Fern. in A. Gray, Man. Bot., ed. 8, fig. 1466. 1950; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 132. 1952; Hylander, Macmil. Wild Flow. Book pl. 166r [in color]. 1954; W. D. Barkley, Nat. Mag. 50: [309]. 1957; Strausbaugh & Core, Fl. W. Va. 3: 777. 1958; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 2, 132. 1958; H. V. Sm., Mich. Wildfls. pl. 155. 1961; Steyerm., Fl. Mo. pl. 302, fig. 4. 1963.

Downy or densely soft-pubescent erect perennial herb, occasionally very robust, sometimes several-stemmed from the base; stems herbaceous, relatively stout, erect, 0.2--2 m. tall, pale-colored, subterete, simple or corymbosely branched above, rather densely hirsute, pilose-hirsute, pale-pubescent, or canescent-hirsute

throughout; roots perennial, elongate, often extending 1 m. or more down into the ground; leaves decussate-opposite or approximate, sessile or nearly so, pale-colored, the blades varying from ovate, oval, lanceolate, or oblong to elliptic, obovate, or suborbicular, thick-textured, 3—10 cm. long, usually quite broad, mostly acute at the apex, short-cuneate at the base or the lower ones often hastate-auriculate, sharply serrate or biserrate to incised or coarsely and acutely incised-serrate along the margins, hirsute and rugose above, strigose-hirsute or densely hirsute-villous beneath, prominently reticulate-venose beneath, the reticulation hirsute; inflorescence spicate, terminal; spikes long and thick, solitary or frequently clustered or corymbose-fasciculate, 30 cm. long or longer, short-pedunculate, cylindric, strict, stout, compact, usually quite densely-flowered and -fruited, strigose-hirsute throughout, the flowers imbricate; bractlets lanceolate-subulate or linear-setaceous, approximately as long as the calyx, ciliate, hirsute; calyx 4--5 mm. long, densely hirsute, its teeth short-acuminate; corolla hypocrateriform, varying from blue, dark-blue, deep-blue, bright-blue, mauvish-blue, violet-blue, or purplish-blue to purplish, purple, violet, or bright-violet, about twice as long as the calyx, its tube protruding slightly beyond the calyx, villous in the throat, pubescent or strigose-hirsute on the outside, the limb 8--9 mm. wide; fruiting calyxes and fruit crowded, overlapping, the cocci brownish, elongate, cylindric or ellipsoid, trigonous, about 2.5 mm. long, raised-reticulate above, strongly striate below, the commissural faces reaching the tip of the coccus, muriculate or almost smooth; chromosome number: 2n = 14.

The species is based on a specimen cultivated in the Jacques Martin Cels nursery near Paris, France, in 1800, probably deposited in the herbarium of the Muséum National d'Histoire Naturelle in that city. The fact that the species is based on a cultivated plant indicates that it has been in cultivation at least as long ago as 1800. The type of V. alopecurus is a specimen cultivated in the Horto Botanico at Madrid, Spain, and deposited in the herbarium of the Jardin Botanico in that city, a phototype being deposited in the herbarium of the Missouri Botanical Garden at St. Louis. The type of V. mollis is said by Merrill (1949) to be the "Arkansas River?", that of V. ringens from "Kentucky", and that of V. cuneifolia from "Pa., Md., & Va." The name, V. hastata stricta Rydb., is apparently based on F. E. Clements s.n., collected in Nebraska in 1893 and deposited in the United States National Herbarium at Washington. The V. stricta x hastata Gates is in part also xV. moechina Moldenke and xV. rydbergii Moldenke; the V. scoparia of Hooker and of Gillies & Hooker are Diostea scoparia (Gill. & Hook.) Miers. The name V. quintus was proposed in jest by W. D. Barkley, illustrated by dorsal and ventral views of cocci of V. stricta with insect parts added and the legend "A rare prize is the verbena hardback, Verbena quintus, the male of which is the only known creature having an odd number of legs."

The "Verbena foliis ovato-oblongis, crenato-serratis ramisque pilosis" which Poiret accredits to Vahl, Enum. Pl. 1: 207, does not occur as a Verbena name in Vahl's book, but with "Stachytarpheta" as the first word is Vahl's description of his perfectly valid Stachytarpheta strigosa Vahl. Why Poiret shifted it to Verbena is not clear to me since he does not give Stachytarpheta strigosa as another synonym of Verbena stricta.

Poindexter (1962), in his comparison of V. stricta with V. hastata, xV. rydbergii, and xV. illicita, describes V. stricta as having a leaf-index of 1.3--2.1 (average 1.8); leaf-shape elliptic to ovate; leaf-base broadly attenuate to sessile; leaf-apex acute to rounded; stem pubescence hirsute; nutlet length 2.2--2.9 (average 2.6); markings on back of nutlet deeply ribbed; pollen fertility 50--100 percent (average 90 percent); corolla-tube length 4.5--5.5 (average 4.9); calyx length 2.8--5.1 (average 4.3); and petiole lateral vein measurement 3--6 (average 3.8). His data are apparently based, in part, at least, on the following of his collections, for all of which (except the second) he records a chromosome number of n= 7: Poindexter 37, 166-17 (pollen fertility 90 percent), 201-46 (91 percent), 207-27 (98 percent), 229-6 (98 percent), and 229-20 (73 percent). It should be noted here that Schwencke (1931) reports the haploid chromosome number as 6.

Walpers (1845) places V. stricta in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Micranthae, and Secondary Subgroup Holophyllae, with 22 other species.

The species has been collected in meadows and fields, old fields and dry fields, sandy or grassy fields and clover fields, waste fields and old eroded fields, open sandy fields, pastures and waste places, prairie and dry prairie or grassland pastures, dry or sandy-clay pastures, old or weedy pastures, dry open or rocky pastures, rocky or sandy prairie pastures, overgrazed or very rocky hilltop pastures, dry lowland or dry shortgrass prairie rangeland pastures, dry meadows, low or grassy meadows, woods and open woods, low oak-hickory woods, open wooded pastures, dry timber, open places and vacant lots, railroad yards and old Amerind graveyards, ditches and roadside ditches, creek bottoms and piney creek bottoms, draws and dry ponds, thickets, oak-elm woods and oak-hickory associations, openings of calcareous woodlands, dry streambeds and dry sandy valleys, moist places, high bottoms, and bottomlands, low wooded pond-margins, low sandy waste areas and sandy valley land, grasslands and dry grasslands, canyons and gravel-pits, cedar glades and barrens, gullies and dump-grounds, dry areas and dry places along railroads, and dune areas.

Collectors have encountered it in low marshy areas along creeks, prairie draws, bromegrass pastures mowed each summer, breaks of prairie with Asclepias, ravines and broad ravines, waste areas in old feed lots, pine forests as well as fields bordering creek woods, upland shortgrass and moderately grazed tallgrass prairies,

eroded prairie ravines and low ravines in prairie pastures, grazed pastures on prairies, and the wet alluvium of floodplains.

It has been found growing in low or open dry ground, in open ground around shipyards, in low open ground, in dry or dry hard soil, dry soil along edge of cultivated fields, dry sandy and gravelly soil, sandy or sandy dry soil, dry sterile or waste soil, thin loam soil, clay soil with many rocks, disturbed gravelly or alluvial soil, chalky or red gypsum soil, clay and black clay soil, moist clay or sandy clay soil, hard clayish soil, and Plainfield Fine Sandy Loam soil, in very rolling heavy clay, black loam, sandy or clay loam, yellow fine sandy loam, clayey and gravelly calcareous loam, moist to dry loam, mesophytic sand loam, dry loam of roadsides, sand, dry sand, and limestone.

Collectors report is from prairies and plains, sand hills, sandstone hills, sand pits, dry calcareous loam on chalk cliffs, beaches and sand mounds, railroad embankments, and dry ballast along railroads. They have found it on roadside and rocky bluestem prairies, dry and alluvial prairies, sand and sandhill prairies, tallgrass and Liatris spicata prairies, buffalograss and limestone prairies, rolling or disturbed prairies, prairie bluffs and knobs, sandy plains and prairies, dry hills and dry sterile hillsides, dry or dry clay ridges, rocky arid or rocky prairie hillsides, prairie pasture hillsides, limestone slopes and ridges, rocky or sandstone ridges, the tops of escarpments, caliche outcrops, low rocky hills and ridges, dry open ridges and black oak sand ridges, sand dunes, low rocky clay or sand ridges, river bottoms, sandy or clay-loam bottoms, the tops of cliffs and rocky hilltops, dry roadside banks and open creek banks, dry banks and hillsides, floodplains, on sandy or rocky slopes and gravel terraces, sandy and rocky creek bottoms, sandy embankments and levees, the banks of artesian springs, on ballast and hardland, on bluffs and ledges, on rocks, at the edge of woods, the base of bluffs, the borders of roadsides, and at swale margins. It grows along roads and roadsides, dry or open roadsides, sandy or high prairie roadsides, the edges of ditches and small streams, the banks of small occasional streams, the borders of fields in floodplain woods, along irrigation ditches and river fronts or riverbanks, along railroads and railroad rights-of-way, the paths made by grazing livestock in bluegrass prairie pastures, and along streets and sandy roads.

Gates (1940) says that V. stricta grows in "Dry soils, valleys, thickets, and waste places" throughout Kansas "except southwest corner" and calls it a hemicryptophyte. Also in Kansas, McGregor refers to it as "common in low places in shortgrass pastures", "common in eroded prairie ravines", "common in low places", "common in moist area between sand dunes", and "common in dry sandy prairie ravines"; "abundant in disturbed areas of prairie hay meadows", "abundant in low ravines", and "abundant in low moist prairie pastures"; "mostly in ravines"; "scattered", "scattered in disturbed parts", "scattered in prairie ravines", and "scattered on prairie hillslopes"; "not common in dry overgrazed prairie pas-

tures", and "not common in sandy pastures"; "large colonies in ravines in sandy prairie pastures", "large colonies in rocky prairie pasture ravines", and "very large extensive colony in overgrazed bluestem pasture". Lathrop found it on "roadside bank bordering a prairie pasture with limestone surfacing". Volle describes it as "prevalent in dry loam, grasslands and roadsides" and "common in woodland undergrowth". Marsh describes it as "common on prairie" and "common in Flint Hills limestone on rocky hilly prairies". Harms avers that it is abundant in ungrazed annually mowed prairies and "numerous though scattered in sandy loam". Unger states that it is "rare in sandy hummocks". Hulbert refers to it as "sparse in sandy loam pastures", while Wagenknecht found it in "upland bluestem pasture near large limestone outcrops" in "disturbed area in slightly overgrazed bluestem prairie", "common in large colonies in weedy overgrazed pasture along riverbanks" and a "common weed along edge of roadside ditches." Horr found it "scattered over [Trego] county in rich loam with fair soil moisture", "scattered all over [Meade] county in dry soil", "scattered in dry grassland, dry loam [Norton County]", "common in dry loam of overgrazed pastures [in Russell County]", and "common along roadside and waste land" in Coffey County.

In Illinois it is reported by Cranwill as "very common" in Jackson County and by McDonald as "abundant" in Peoria County, while Jones (1945) says of it "roadsides and fields, common. June–Sept." In Iowa it is described by Pammel as "a common weed in the Missouri loess, associated with Gaura coccinea, Chrysopsis villosa, and Heliopsis scabra" and "common in clearings, sandy clay soil associated with Asclepias verticillata, A. tuberosa, Coreopsis palmata, Heliopsis scabra, and Leptilon canadense", and "a common weed, sandy soil and pastures associated with V. bracteata, Plantago preslii, Delphinium penardi, and Viola pedata", and "common in sandy clay soil associated with Polygala sanguinea, Coreopsis palmata, Lespedeza capitata, Lepachys pinnata, and Parthenium integrifolium", and "common everywhere on gravel hills, sandy soil, throughout Iowa, a common weed in pastures". Pammel & Zimmerman report that it is "a common weed in sandy soil, knolls, and groves with Solidago missouriensis and V. bracteata", while Hayden describes it as "common on dry knolls".

Fawcett says that it is found "on barrens and prairies, Ohio to Dakota, south to Texas and New Mexico", while Muenscher says "Native from Ontario westward to the Rocky Mountains; sparingly introduced in the northeastern states".

In Texas it is found in pastures, prairies, and waste places, usually in dry soil, and on railroad embankments, blooming from June to September, mostly in the Blackland Prairies and Plains Country in southeastern Texas, from Lipscomb to Red River, Liberty, and Gonzales Counties. Cory calls it "abundant in flood plains" in that state, while Hennen reports it as scarce "in full sun" and Lynch says "infrequent to frequent in abandoned sterile fields". Clevender describes it as "common" in Platte County,

Nebraska, while in Biol. Abstr. (1954) it is said to be an "invader of degenerate prairies" in that state, and Harms reports a "large colony in prairie" there.

Groh (1944) says of V. stricta: "Perennial. A weed in dry or gravelly soil" in Canada; Dodge says "becoming abundant in dry open ground" at Point Edward, Ontario, in 1911. In South Dakota it was found by Hayward along "streamsides with Salix, Quercus, Populus" and Harms describes it as "frequent in black loam of lightly grazed prairie" and "common in gravelly sandy loam on grazed prairie bluffs", while in Richland County, North Dakota, it is said by Stevens to be "common locally, but little farther". Cory found it to be "frequent in grassland bordering creek" in Oklahoma, while Robbins found it in "desiccated depressions along railroad rights-of-way". Ramaley calls it "ruderal" in Colorado, while Weber & Anderson refer to it there as a "weed along roadside".

In Wisconsin it was encountered by Ugent "in dry sandy soil with Opuntia", Arnot found it "in open dry roadside in former clay-soil prairie", Iltis & Neess call it "a weed at edge of highway", while Wills encountered it "on high sandstone bluff, north-facing densely wooded hillside". In the same state Iltis discovered it on a "very steep dry south- and southwest-facing Bouteloua-Andropogon goat prairie", while Iltis, Bell, Melchert, Patman, & Witton found it on "high granite cliffs, ledges, and pavement on exhumed red granite monadnocks" and Haggene, Melville, & Shaughnessy encountered it on "north-facing mixed hardwood hillside and limestone roadcut", Burton says "grassy field, appearing as a weed", Grether found it in "high goat prairie" and Heddle says that it grows "with Hedeoma hispida and Silene antirrhina in abandoned dry sand pit" and in "dry bluegrass pasture on south slope of rock ridge". Taylor reports it common on dry roadsides in that state.

In Missouri it is said by Bush to be "common in fields", by Marsh as "common along roadsides in cherty soil with limestone surfacing in oak-hickory woods", and by McGregor as "common in rocky open areas". Ewan found it in "rather deep sandy alluvium or river benchlands, full sun, among bushes back from the shore" in Colorado.

Monachino (1960) records the species from Bronx County, New York; Tatnall says that it is "well established in waste ground along rivers" in Delaware, while Earle found it in "waste ground around shipyard" in that state. Small s.n. [Sept. 25, 1891] from Lancaster County, Pennsylvania, bears a notation "introduced from west".

E. J. Palmer (1916) records his nos. 199, 675, and 2980 from Jasper County, Missouri. In his 1935 publication he states that the species inhabits "Prairies, thickets, glades, and waste ground. Circumneutral. General." Thorne (1955) calls it an "Abundant weed of overgrazed pastures, railroads, and other open places" in Iowa. Duncan (1950, 1953) records it from Douglas

County, Georgia. Lehr (1962) reports it from Rockland County, New York, where he notes that its predominant associates are Lobelia spicata and Rudbeckia serotina; Weber records his no. 1724 from Columbia County in the same state. Deam, Yuncker, & Friesner (1953) record it from DeKalb and Fountain Counties, Indiana, on the basis of F. A. Swink collections not as yet seen by me; in their 1947 work they record it from Huntington County; in their 1950 publication, from Orange County; and, with Kriebel (1945), from Delaware County. The "Porter" County, Iowa, record given for this species by me in my Résumé, page 18 (1959) is an error for Porter County, Indiana. Jones (1942) cites R. E. Shanks s.n. from Wood County, Ohio, while Braun (1943) records the species from Jessamine and Trigg Counties, Kentucky.

Steyermark (1963) records Verbena stricta from Andrew, Atchison, Bollinger, Buchanan, Butler, Caldwell, Cape Girardeau, Carroll, Carter, Cedar, Christian, Clark, Cole, Cooper, Dade, Dallas, DeKalb, Daviess, Dent, Douglas, Dunklin, Gasconade, Gentry, Harrison, Holt, Howard, Howell, Jefferson, Johnson, Laclede, Lafayette, Lawrence, Lewis, Linn, Livingston, Madison, McDonald, Mercer, Mississippi, Moniteau, Monroe, Montgomery, New Madrid, Newton, Oregon, Osage, Perry, Polk, Pulaski, Putnam, Ray, Ripley, Saint Clair, Saint Francis, Sainte Genevieve, Saline, Schuyler, Scott, Shannon, Shelby, Stoddard, Sullivan, Texas, Vernon, Washington, & Webster Counties, Missouri, on the basis of specimens preserved in the herbarium of the Missouri Botanical Garden at St. Louis, not as yet seen by me.

In general, I would say that this species grows from Ontario and Ohio to Minnesota, South Dakota, and Wyoming, south to Texas and New Mexico; introduced in the eastern and southeastern states and in Washington and Quebec. The specific name is sometimes uppercased for no valid reason. The plant has been collected in flower in January and from May to October, and in fruit from May to October and in December, at altitudes of 200 to 7300 feet, usually in full sunlight.

Material of Verbena stricta has been misidentified and distributed in herbaria under the names V. bractiosa Michx., V. canadensis Britton, V. diffusa Desf., V. hastata L., V. hastata x stricta Gates, V. lasiostachys Link, V. macdouglalii Heller, V. officinalis L., V. prostrata R. Br., and xV. rydbergii Moldenke, as well as Phyllanthus carolinensis Walt. (Euphorbiaceae), Stachys tenuifolia Willd. (Lamiaceae), Trianthema portulacastrum L. (Tetragoniaceae), Veronica arvensis L. and V. prostrata R. Br. (Scrophulariaceae).

On the other hand, the Over 14306 and Shear 149, distributed as V. stricta, are actually f. albiflora Wadmond; T. S. Brandegee s.n. [Providence Mts., May 26, 1902] is V. gooddingii Briq.; S. Williams 96 is V. halei Small; B. L. Wagenknecht 1927 is V. hastata L.; Rickett s.n. [Rockbridge, July 9, 1927] is xV. illicita Mol-

denke; H. S. Barber 152, M. E. Jones 6026 & 6054w, and Wooton 208 & s.n. [Mts. west of Grant's Station, August 1st, 1892] are V. macdougalii Heller; Demaree 29179 & 30963 and Favor s.n. [June 16, 1901] are xV. moechina Moldenke; Toumey s.n. [Sept. 17, 1894] is V. robusta Greene; Glatfelter s.n. [St. Louis, 6-3-92], Somes 3704, and B. L. Wagenknecht 3788 are xV. rydbergii Moldenke; F. C. Gates 3519 and H. W. Houghton 4032 are V. urticifolia L.; C. C. Albers 33013, Condit s.n. [Houston, June 19, 1909], Harding 172, and H. Ness s.n. [June 26, 1925] are V. xutha Lehm.; A. W. Chapman s.n. [1845] and R. K. Godfrey 4239 are Stylodon carneus (Medic.) Moldenke; and Porter 5150 is Salvia sylvestris L. (Lamiaceae).

Cinq-Mars s.n. [31 juillet 1951], A. S. Hitchcock s.n. [Ames, July '82], and Rydberg 1422 are mixtures with f. albiflora Wadmond; Kraeger 475 is a mixture with V. hastata var. scabra Moldenke; Demaree 29151 and L. H. Pammel s.n. [Hamilton, Sept. 8, 1918] & s.n. [Granite, Sept. 1, 1920] are mixtures with xV. rydbergii Moldenke; Z. Baldwin s.n. is a mixture with V. simplex Lehm.; and Schneck s.n. [Sept. 1, 1887] is a mixture with V. urticifolia L. The G. E. Morley 376 & 396, distributed as V. stricta with the comment "a very light color" of flower, are cited by me as f. roseiflora Benke, but may actually represent another undescribed color form corresponding to the f. caerulea Moldenke of V. hastata L.

Miss Gaiser says of her 1382aPE "scattered plants", of 1759PE "this population seemed to have generally less deeply lobed leaves", and of 2306PE "no hint of hybridization, just typical stricta in these sand hills along the beginning of lake toward Light House."

Schneck s.n. [July 25, 1897] has a spike fasciated at the apex; R. E. Shanks 1790 has rather slender spikes; C. R. Ball 2439 has two binary leaves; E. W. Fell 51309 has its leaves unusually narrow; E. Hall s.n. [Athens, Aug. 1863] bears the interesting notation "unadulterated". Demaree 30203 and F. J. Hermann 9159 are abnormal, somewhat resembling xV. rydbergii, but have the spikes heavily fruited so I am regarding them as V. stricta. Shimek s. n. [Oct. 14, 1919] was originally identified as "V. stricta x angustifolia"; A. E. Allen s.n. [Talmage, July 11, 1891], A. S. Hitchcock s.n. [Medicine L., July 1892], and J. L. Sheldon s.n. [Peru, July 21, 1900] were called "V. stricta x hastata"; W. H. Horr E.33 was distributed as "V. hastata x stricta"; L. H. Pammel s.n. [Comanche, Sept. 13, 1918] bears the ambiguous identification "V. stricta x spicata"; and Loomis s.n. [Alton, Oct. 1938], Muck 82, and S. V. Fraser 440 were cited as "V. stricta x hastata" in Gates, Kans. Fl. -- I regard all of these collections as typical Verbena stricta, as also R. Bebb 4376, originally thought by the

collector to represent a cross with V. simplex Lehm.; H. N. Patterson s.n. [vicinity of Oquawka], labeled "Verbena stricta x bracteosa (Erect), very slightly mixed with V. bract. or is it hastata? or both?"; and the Herb. Hort. Bot. Basil. s.n. [1850] annotated by Perry as "possibly a garden hybrid".

On the other hand, Evers 198 may be a hybrid, since the tips of some of its spikes have the flowers distant. Deane s.n. [Medford, Nov. 13, 1887] consists of seeds only; S. F. Norton s.n. [June 27, '94] bears a notation averring that it was collected "at the exact center of continental U.S.A." The Herb. Calif. Acad. Sci. 31415 does not bear any indication on its label that it came from cultivated material, but I am assuming that it did. L. H. Pammel s.n. [Waseka, Aug. 1920] is marked "Wisc." on its label, but this locality is actually in Minnesota.

In my 1940 work I followed Perry in regarding V. stricta f. albiflora Wadmond and f. roseiflora Benke as synonymous with V. stricta, but I have since decided that these represent distinct and nomenclaturally worthy color forms. The C. M. Rowell 4115, cited below, is described by the collector as having had the corollas "lavender to pale purple" and so may possibly represent f. roseiflora. Davidson, Dixit, & Romberg 4689 is described as having had "flowers white and lavender" and is cited by me under f. albiflora. The corolla is described as "deep-blue" on Chamney 1, "blue" on Horr 4548, 4662, & 4767, "dark-blue" on McGregor 9367, "violet" on Marsh 1735, and "bright-violet" on Marsh 1613.

Bergen (1892) states that V. stricta is thought to be specific against fever and ague -- hence the common name of "fever-weed". H. V. Smith (1961) claims that the plant shows markable resistance to drought and "The foliage is so bitter that cattle will not eat it even when forage is scarce. The root system extends down more than a yard in dry soil, open sandy ground, in barren fields, along roads" in Michigan. Bailey (1935) states that its seeds are available to the horticultural trade from Rex D. Pearce.

The following fungi are known to attack V. stricta: Aecidium verbenae Auct. Amer. (non Speg.), A. verbenicola Ellis & Kellerm., Cercospora verbenae-strictae Peck, C. verbenicola Ellis & Ev., Dicaeoma verbenicola Arth., Erysiphe horridula Lév., E. lamprocarpa Auct. Amer. (in part), Phyllosticta verbenicola Martin, Puccinia sydowiana Diet., P. verbenicola Arth., P. vilfae Arth. & Holw., Septoria verbenae Rob., and Stagonospora verbenae Greene.

Mitchell (1960) and my son, Andrew Ralph Moldenke, report that the flowers of V. stricta are regularly visited by the bee, Calliopsis nebraskensis Crawford, the female taking pollen and nectar, the male taking only nectar.

Common and vernacular names recorded for V. stricta are "blue verbena", "blue vervain", "blue vervian", "bur-vine", "common ver-

vain", "fever-weed", "hairy vervain", "hoary-leaved vervain", "hoary verbena", "hoary-verbena", "hoar vervain", "hoary vervain", "mullen-leafed vervain", "mullenleaf vervain", "mullen leaved verbena", "mullen leaved vervain", "mullen-leaved vervain", "purple vervain", "stout upright vervain", "thimble-weed", "upright vervain", "verbena", "vervain", "verveine", "verveine à tige droite", "wild hyssop", and "woolly verbena". It should be noted, however, that the names "verbena", "vervain", and "verveine" are applied to the genus as a whole and to many other species in it; "bur-vine" is applied also to V. simplex and V. urticifolia; "blue verbena", "blue vervain", and "wild hyssop" are applied also to V. hastata; "common vervain" is applied also to V. officinalis and V. urticifolia; and "thimble-weed" is applied also to Anemone virginiana L. (Ranunculaceae), Petalostemon purpureum (Vent.) Rydb. (Fabaceae), and Rudbeckia laciniata L. (Carduaceae).

Verbena stricta is known to hybridize freely -- the hybrid with V. bracteata Lag. & Rodr, is xV. deamii Moldenke, that with V. halei Small is xV. goodmani Moldenke, that with V. hastata L. is xV. rydbergii Moldenke, that with V. simplex Lehm. is xV. moechina Moldenke, and that with V. urticifolia L. is xV. illicita Moldenke.

George J. Goodman, in a letter to me dated October 24, 1960, states that Edw. Palmer 351 (re-numbered "243" by Torrey) was collected in Johnson County, Oklahoma, on June 25, 1868, and not from "the False Washita" or "Fort Arbuckle" as stated on the label.

Hooker (1836) cites T. Drummond s.n. [St. Louis] in the Kew herbarium. Schauer (1847) cites Riehl 196 and Engelmann s.n. from "In Americae septentr. austral. et austrooccidentalibus" in the DeCandolle Herbarium at Geneva, not as yet seen by me. Groh (1944) cites R. Cameron s.n. [Stamford, Welland Co., 1898], Dore & Groh 1805, Dore s.n. [N. of North Rideau, Carleton Co., 1943], Fisher s.n. [Sarnia, Lambton Co., 1902], Dent s.n. [Sarnia, Lambton Co., 1909], Montgomery 709 [Waterloo Co.], Owens s.n. [Toronto, York Co., 1944], Armstrong s.n. [Jarmyn, Peterborough Co., 1903], and Scott s.n. [St. David's, Lincoln Co., 1898] from Ontario, and Dore s.n. [sandy pasture field, Danford Lake, Pontiac Co., 1931] from Quebec, not as yet seen by me.

Perry (1933) regarded f. roseiflora Benke and f. albiflora Wadmond as synonymous with V. stricta, but I regard them as distinct. She gives the distribution of the species as "eastern and central United States, from Pennsylvania westward through the Rocky Mountains. Probably introduced into other localities." She cites the following 120 specimens and 1 photograph not as yet seen by me: MASSACHUSETTS: Bristol Co.: Sanford s.n. [Fall River, 2 Sept. 1903] (G). CONNECTICUT: Fairfield Co.: E. H. Eames s.n. [Bridgeport, 27 Aug. 1892] (G). New Haven Co.: Blewitt 14 (G). NEW YORK: Tompkins

Co.: A. J. Eames 12797 (G). PENNSYLVANIA: Lancaster Co.: Urban s.n. [along Lincoln Highway at Gap] (G). OHIO: Montgomery Co.: Short s.n. [Dayton] (E). ILLINOIS: Hancock Co.: F. C. Gates 9994 (E). Henderson Co.: H. N. Patterson s.n. [Oquawka, 1872] (G). Jackson Co.: H. A. Gleason s.n. [Grand Tower, 22 Aug. 1900] (G). LaSalle Co.: Thone 88 (E). Macon Co.: H. A. Gleason 377 (G). Madison Co.: Sherff s.n. [Mississippi River, bluffs north of Alton, 4 Aug. 1910] (G). McLean Co.: Robinson s.n. [Bloomington, July 1886] (G). Menard Co.: E. Hall s.n. [Athens, Aug. 1863] (E). Pike Co.: J. Davis 16 (E), 6370 (E). Richland Co.: Ridgway 2431 (E). Saint Clair Co.: Eggert s.n. [E. St. Louis, 28 July 1900] (E). Will Co.: Umbach s.n. [Romeo, 26 July 1897] (E). Stony Island: H. H. Smith 5645 (E, G), 5952 (G), 6028 (E, G). INDIANA: Harrison Co.: C. C. Deam 20357a (G). Kosciusko Co.: C. C. Deam s.n. [northeast of Winona Lake, August 2, 1897] (E). Lake Co.: Lansing 2810 (G). IOWA: Cerro Gordo Co.: M. E. Jones s.n. [14 Aug. 1899] (E); L. H. Pammel 85 (E, G). Henry Co.: Ball 1585 (E). Van Buren Co.: Graves 1947 (E), 1994 (E). KENTUCKY: Ballard Co.: McFarland & Anderson 253 (E). MICHIGAN: Saint Joseph Co.: G. L. Fisher 19 (E). WISCONSIN: Dane Co.: Trelease s.n. [Oregon road, Madison, 29 July 1889] (E). Trempeleau Co.: Hale s.n. [Trempeleau, 1861] (G). Waupaca Co.: Garesche s.n. [Waupaca, 1907] (E). County undetermined: Eggert s.n. [Mirror Lake, 15 July 1903] (E). MINNESOTA: Hennepin Co.: Schuette s.n. [St. Anthony, July 7, 1888] (G). Houston Co.: Freiberg s.n. [July 1912] (E). Kandiyohi Co.: W. D. Frost s.n. [Willmar, July 1892] (G). Ottertail Co.: Chandonnet s.n. [Perham, August 8, 1912] (E). Wabasha Co.: Manning s.n. [Lake City, 28 July 1883] (G). SOUTH DAKOTA: Brookings Co.: Johnson s.n. [Windsor Township, 27 July 1903] (E). Jackson Co.: E. J. Palmer 37627 (E, G). Lawrence Co.: W. P. Carr 118 (E, G). Roberts Co.: Over 14386 (W). Sanborn Co.: Visher 4450 (E). KANSAS: Hamilton Co.: C. H. Thompson 154 (E, G). Montgomery Co.: Rydberg & Imler 433 (E). Osborne Co.: Shear 191 (G). Pottawatomie Co.: A. S. Hitchcock 972 (W). Riley Co.: J. B. S. Norton 391 (E, G). MISSOURI: Benton Co.: Trelease 717 (E). Camden Co.: Emig 107 (E). Clay Co.: K. K. Mackenzie 261 (E). Jackson Co.: B. F. Bush 475 (E). Jasper Co.: E. J. Palmer 199 (E), 2980 (E); Trelease 718 (E). Lincoln Co.: Beckwith 48 (E). Marion Co.: J. Davis 1202 (E), 1513 (E), 2791 (E), 2960 (E), 2962 (E), 3227 (E), 3589 (E), 4461 (E), 4487 (E). Phelps Co.: Kellogg 498 (E). Saint Louis Co.: Letterman s.n. [Allenton](E); Redfield 522 (E). Taney Co.: B. F. Bush 570 (E). Wayne Co.: E. J. Palmer 6107 (E). Wright Co.: Lansing 3164 (G). Saint Louis: Engelmann s.n. [St. Louis, Aug. 1841] (G); Riehl 196 (E). ARKANSAS: Craighead Co.: Demaree 3553 (E). Wash-

ington Co.: F. L. Harvey 61 (E). County undetermined: F. L. Harvey s.n. [Curtiss 1958] (G). MONTANA: Big Horn Co.: Blankinship s.n. [Crow Agency, July 14, 1901] (G). WYOMING: Laramie Co.: A. Nelson 538 (G). Platte Co.: A. Nelson 505 (E, G). COLORADO: Denver Co.: Eastwood 90 (E, G). Yuma Co.: Eggleston 15224 (E). NEBRASKA: Custer Co.: Bates s.n. [Callaway, 27 June 1901] (G); L. H. Pammel s.n. [Broken Bow, 7 July 1897] (E). Harlan Co.: L. H. Pammel s.n. [Alma, June 21, 1897] (E). Lancaster Co.: Webber s. n. [Lincoln, 27 June 1885] (E). Lincoln Co.: H. Engelmann s.n. [South Fork of the Platte, July 1856] (E, G). Merrick Co.: A. A. Heller 14290 (E). Thomas Co.: Rydberg 1422, in part [Dismal River south of Thedford, 27 June 1893] (G). OKLAHOMA: Choctaw Co.: H. W. Houghton s.n. [Stevens 4000] (E, G). Cleveland Co.: Emig 365 (E). Comanche Co.: M. K. Clemens 11748 (E); G. W. Stevens 1354 1/2 (E, G). Ellis Co.: G. W. Stevens 2930 (G). Greer Co.: G. W. Stevens 1034 (G). Harper Co.: Stratton 403 (E). Kay Co.: G. W. Stevens 1865 (G). Murray Co.: Emig 787 (E). Pawnee Co.: Stratton 249 (E). Rogers Co.: B. F. Bush 435 (E). TEXAS: Dallas Co.: J. Reverchon 735 (E), s.n. [Dallas] (G). Hemphill Co.: Eggert s.n. [near Canadian, 11 Aug. 1900] (E). NEW MEXICO: Santa Fe Co.: Fendler 597, in part (D, G). WASHINGTON: Stevens Co.: Kreager 475, in part (G). CULTIVATED: Spain: Herb. Bot. Gard. Madrid s.n. (E--photo). The Bain 328, Bush 475, Rydberg 1422, and Small s.n. which she cites from "NY" are actually in the Columbia University herbarium; what she cites as "Harvey 1958" from "NY" is herein cited as Harvey s.n. [Curtiss 1958] in the Columbia University herbarium; her Reverchon s.n. from Dallas at "NY" is probably the J. Reverchon s.n. [Dallas, May 1877] in the Barnard College herbarium; her Jones s.n. from Grinnell, "Aug. 1877", is probably the "Aug. 8, 1877" collection cited below; and what she cites as "Houghton 4000" is listed by me as Houghton s.n. [Stevens 4000]. Of V. stricta she says "A very distinct species somewhat incapable of sharp delimitation on account of the tendency to hybridize with neighboring species. Normally it is recognized by its stout compact spike, imbricated flowers, and ovate-orbicular sessile leaves."

In all, 1916 herbarium specimens and 2 mounted illustrations have been examined by me.

Citations: QUEBEC: Deux-Montagnes Co.: Cinq-Mars s.n. [31 juillet 1951] (Mg, Vi); Cléonique-Joseph 11964 (Vi); Louis-Marie s.n. [27 juillet 1937] (Ca--8494); Major-Barnebé 1031 (Vi). Pontiac Co.: Lamarre s.n. [Onslow Corners, 7 août 1951] (S). ONTARIO: Huron Co.: Marie-Victorin, Rolland-Germain, & Dominique 45993 (Um--207). Lambton Co.: J. Dearness s.n. [Pt. Edward, 13th August 1902] (Mg); C. K. Dodge s.n. [Point Edward, July 27, 1902] (Mi, Mi), s.n. [8/27/10] (Ob--87659), s.n. [Point Edward, July 11,

1911] (Mi), s.n. [Point Edward, 8/27/40] (Au, Au); G. L. Fisher s.n. [Sarnia, Aug. 5, 1902] (B); Gaiser 1382aPE (Gp, Gp, Gp, Mm), 1618PE (Gp, Gp, Gp, Mm), 1759PE (Gp, Gp, Gp, Mm), 2178PE (Gp, Gp, Gp, Mm), 2306PE (Gp, Gp, Gp, Mm); Gaiser & Montgomery 2234PE (Gp); Gaiser & Slobasky 1382 (Gp, Gp, Gp, Gp, Mm). Middlesex Co.: Colgrove s.n. [Strathroy, 31 Aug. 1934] (Mg). MASSACHUSETTS: Middlesex Co.: Deane s.n. [Medford, Nov. 13, 1887] (Ba). CONNECTICUT: Fairfield Co.: E. H. Eames s.n. [Bridgeport, VIII.27.1892] (N, W—283608). Litchfield Co.: E. H. Eames 10221 (In). NEW YORK: Albany Co.: H. D. House 18369 (Al). Cattaraugus Co.: M. Zimmerman s.n. [Red House, Aug. 8, 1935] (Ba). Columbia Co.: W. A. Weber 1724 (Bl—48174). Queens Co.: Monachino 94 (Bt—35373, Dp, H—40674, I, Io—145159, N, N, Ok, Ur). Rockland Co.: Lehr 1034 (N). Suffolk Co.: Disbrow s.n. [E. Hamp., 1894] (Nm). Tompkins Co.: A. J. Eames 12797 (S); Muenscher & Bechtel 463 (Ba, Gg—31421, Io—112276, Pl—63267). Ulster Co.: Elting 2073 (Al). Warren Co.: H. D. House 28901 (Al). Washington Co.: Carpenter s.n. [Granville, Aug. 1911] (Vt); Pember s.n. [Granville, Aug. 4, 1911] (Vt), s.n. [23 Aug. 1911] (Al). NEW JERSEY: Hudson Co.: Van Sickle s.n. [New Durham, July 15, 1893] (Tc, W—309648), s.n. [Granton, Sept. 21, 1895] (W—243275). Morris Co.: Monachino 462 (Ec, Jr, Ml, N), s.n. [Budd Lake, Sept. 17, 1939] (N). PENNSYLVANIA: Allegheny Co.: Bright s.n. [Aug. 27, 1922] (Cm, Cm); B. H. Patterson s.n. [Sept. 2, 1918] (Cm, Cm, Cm). Lancaster Co.: A. A. Heller 638 (W), s.n. [Conewago, Sept. 27, 1901] (W—407055); J. K. Small 106 (Ob—50840), s.n. [vicinity of Dillerville, July 25, 1890] (Up—17126, W—298654), s.n. [Conewago, August 30, 1890] (Io—20756), s.n. [Sept. 25, 1891] (C), s.n. [vicinity of Conewago, September 1892] (C). Philadelphia Co.: Eckfeldt s.n [June 20, 1913] (Up). Westmoreland Co.: Shafer s.n. [July 19, 1900] (Cm), s.n. [July 20, 1900] (Cm). Presque Isle: Ammons, Strausbaugh, & Bartholomew s.n. [Presque Isle, July 29, 1940] (We). DELAWARE: New Castle Co.: E. Tatnall s.n. [July 1881] (Pa). Sussex Co.: E. C. Earle 1781 (Ca—6869, Up); J. H. Holmes 242 1/2 (Ka); R. R. Tatnall 3122 (Up). WEST VIRGINIA: Pocahontas Co.: Herb. West Va. Univ. Bot. Exped. 1081 (We, We, We). NORTH CAROLINA: Onslow Co.: Ahles 599 (Ur). ALABAMA: Cullman Co.: C. Mohr s.n. [Cullman, May 29, 1892] (W—771847). OHIO: Butler Co.: Miller & Roth s.n. [July 15, 1932] (Ob—80600). Champaign Co.: T. Draper A.157 [Herb. Leonard 6400] (W—2161893); E. C. Leonard 17267 (W—1601267). Clark Co.: Black 36-7098 (Be—47803). Hamilton Co.: Aiken 10691 (Ll), s.n. [Terrace Park, VII-25-1905] (Po—267631); E. L. Braun s.n. [7/25/05] (Cn, Cn), s.n. [Terrace Park, Aug. 9, '17] (Cn), s.n. [Terrace Park, Aug. 19] (Cn); J. Clark s.

n. [Cincinnati] (Bm); Collector undesignated s.n. (Cn); C. J. Herrick s.n. [Aug. 24, 1889] (Ob—80601); M. Mohr 467 (Ll). Lake Co.: H. C. Beardslee s.n. [June 2nd, 1870] (Ob--80599). Montgomery Co.: G. S. Graves s.n. [12 August 1880] (Al); E. C. Leonard 2440 [Herb. Leonard 4382] (W--2161775); Leonard & Mannakee 5552 [Herb. Leonard 4393] (W--2161861); H. P. Smith 1958 (Dt). Sandusky Co.: Moseley s.n. [Gibsonburg, Aug. 9, 1920] (Mi). Union Co.: A. R. Moldenke 794 (Lw). Wood Co.: Moseley s.n. [Bowling Green, June 12, 1921] (Mi, Mi); R. E. Shanks 1790 (N). County undetermined: J. L. James s.n. (Du--9544); Jewett s.n. [July 12, 1842] (Mi); C. G. Lloyd s.n. (Ll). ILLINOIS: Adams Co.: Brinker 1222 (Il--15905), 2691 (Il--15805), 2729 (Il--15907); E. W. Erlanson 18 (Mi); Evers 197 (Il--25583, N), 198 (Ur), 1446 (Ur); Evers, Jones, & Jones 646 (Ur); A. B. Seymour s.n. [Camp Point, 1 Aug. 1876] (H--106464), s.n. [Adams Co., 1882] (H--106465). Bureau Co.: Congdon s.n. [Princeton, Oct. 1856] (Du--9545); Winterringer 7995 (Il--37248). Carroll Co.: Ahles 4312 (Ur); Collector undesignated s.n. (Il--15871); G. D. Fuller 1747 (Il--15802); Winterringer 8145 (Il--37437). Cass Co.: Ahles 2949 (Ur); G. D. Fuller 11855 (Il--24789); F. C. Gates 551 (Mi); Winterringer 5077 (Il—35517). Champaign Co.: M. H. Bell 161 (Ur); L. J. Blake s.n. [Urbana, 7-15-51] (Ur); R. Crane 1773 (N); Evers 1485 (Ur), 1487 (Ur); H. A. Gleason s.n. [Champaign, July 31, 1900] (In); F. W. Johnson s.n. [Longwood] (N); G. N. Jones 12436 (Au, Ur), 12523 (Il—15808, N, Ur), 12525 (N), 12667 (Il--15807, N, Ur), 15265 (Ur); Piesbergen s.n. [July 2, 1942] (Ur); Seymour & Waite s.n. (Ur--17465); Stubbs 7 (We); Waite s.n. (Ur--29662); Winterringer 4014 (Il--29329). Christian Co.: De Mott s.n. [Taylorville, 8/15/'96] (Ur); Shouse s.n. [July 21, 1950] (Ur). Coles Co.: V. A. Anderson 12594 (Il--20713); G. D. Fuller 10643 (Il--21731, Il--21732). Cook Co.: H. H. Babcock 9283 (Bz--23790), s.n. [Hyde Park, July 3, 1811] (N), s.n. [Chicago, July 3, 1871] (W--310735), s.n. [July 2, 1874] (Sg—16102, W--71941), s.n. [Chicago] (Al); L. H. Bailey s.n. [Chicago, July 27, 1880] (Ba); S. A. Cain s.n. [Aug. 1926] (Bt—2464), s.n. [southern Chicago, 1926] (Bt--2473); M. A. Chase s.n. [Cicero, July 20, 1896] (Ur, Ur); M. H. Clark s.n. [Lincoln Park, July '69] (Mi); Davis & Davis 1635 (We); Dixon & Gage 752 (W—609434); H. S. Fawcett s.n. [Berwyn, 8-25-03] (Io--73684); G. D. Fuller 1312 (Il--15793); Gilman s.n. [Chicago, July '69] (Pr); Roman s.n. [13/9/1893] (S), s.n. [Aug. 1893] (S); Shipman 1358 (Mi); Umbach 5914 (Ca—441527, Ka--62531); Wessén 787 (Go, S), s.n. [Jackson Park, VII.1899] (Gg). DeKalb Co.: P. B. Whitford s.n. [July 19, 1946] (Ur). DeWitt Co.: Winterringer 6766 (Il—34402). Douglas Co.: Winterringer 612 (Ur). Fulton Co.:

Winterringer 8832 (Il--38672). Hancock Co.: F. C. Gates 9994 (Ur); Kirchherr 66 (Il--15917); Kirchherr & Fuller 46 (Il--15803); Mead s.n. [August 1845] (N); L. H. Pammel s.n. [Hamilton, Sept. 8, 1918] (Io--94058). Henderson Co.: H. N. Patterson s.n. [July 1872] (Al), s.n. [near Oquawka, August 1872] (N), s.n. [August 14, 1873] (Al), s.n. [Oquawka] (Cm), s.n. [vicinity of Oquawka] (W--1323124, W--1323125). Henry Co.: Stark s.n. [Orion, July 16/23] (Dp). Jackson Co.: Cranwill s.n. [July 17, 1917] (Ur); Fuller & Welch 915 (Il--15893); J. McCree 915 (Ur). Jasper Co.: Shearer s.n. [9/1/1928] (Ur). Jersey Co.: P. Jacobs 68 (Ur). Jo Daviess Co.: Ahles 4363 (Ur); Winterringer 8148 (Il--37434). Kane Co.: Pearsall 7279 (Il--15806). Kankakee Co.: Collector undesignated s.n. [July 8, 1870] (Ur, Ur). Lake Co.: Earll s.n. [Waukegan, June 1878] (W--491442); F. C. Gates 3160 (Ur). LaSalle Co.: G. D. Fuller 2299 (Il--15798); H. K. Henry 122 (Up); McDougall 45 (Ur); Thone 88 (Ur). Lawrence Co.: Sivert s.n. [June 23, 1949] (Il--31977), s.n. [June 26, 1952] (Ur). Lee Co.: G. D. Fuller 11928 (Il--18896); Keithley 129 (Il--15790), s.n. [June 29, 1943] (Ur); Lyman s.n. [Amboy, 1896] (Dt); Mertz 251 (Cm), s.n. [Dixon, Aug. 14, '77] (Bc), s.n. [Dixon, Aug. 15, 1877] (N). Livingston Co.: G. D. Fuller 9194 (Il--15914); H. N. Moldenke 7607 (N). Logan Co.: Ahles 4044 (Ur); G. Randolph s.n. [July 17, 1959] (St). Macon Co.: H. A. Gleason s.n. [Je. 19, 1896] (Ur); H. N. Moldenke 21909 (Lw, Ut, Z); Winterringer 6502 (Il--33798), 6683 (Il--34267). Macoupin Co.: W. E. Andrews s.n. [June 20, 1889] (Ur); G. D. Fuller 2246 (Il--15799). Madison Co.: Norwood s.n. [July 4, 1948] (Ur). Marion Co.: M. S. Bebb s.n. [Salem] (T). Mason Co.: G. D. Fuller 2243 (Il--15895); H. A. Gleason 9223 (N); G. N. Jones 22383 (Ur); Winterringer 481 (Ur), 514 (Ur). Massac [& Pope] Co.: Whiting 1725 (Il--15800). McDonough Co.: E. R. Boardman s.n. [Prairie] (Go); C. H. Kauffman 458 (Mi); G. N. Jones 22401 (Ur); R. M. Myers C.15 (Il--23944). McHenry Co.: H. R. Bennett s.n. [August 10, 1957] (Go); Mason s.n. [Algonquin, July 27, 1878] (Ur); Vasey s.n. [Ringwood] (Pa). McLean Co.: Calef 545 (Ur); G. D. Fuller 187 (Il--15796). Menard Co.: E. Hall s.n. [1861] (Ur), s.n. [Athens, Aug. 1863] (Pa). Montgomery Co.: Winterringer 3849 (Il--29265). Morgan Co.: E. Epling 6423 (La); A. R. Moldenke 826 (Lw); E. S. Steele s.n. [about 1880] (Ob--50831). Moultrie Co.: Winterringer 4870 (Il--34908). Ogle Co.: Ahles 4547 (Ur); A. L. Hills 3392-O (Il--15892, Ur). Peoria Co.: V. H. Chase 4585 (Ur); M. Fisher s.n. [9-3-1880] (Ka); Heading s.n. [July 1875] (Ur), s.n. [July 18, 1884] (No--25224); F. E. McDonald s.n. [Peoria, May 1887] (Hi--59473), s.n. [Peoria, July 1901] (Ur), s.n. [Peoria, July 1903] (Io--76181, N); Umbach s.n. [July 26, 1897] (N). Piatt Co.:

Ahles 3356 (Ur); F. C. Gates 2125 (W--649182); G. N. Jones 20814 (Ur); R. Pearson s.n. [July 24, 1949] (Ur); A. B. Seymour s.n. [Deland, September 1889] (H--10772). Pike Co.: J. Davis 16 (Ur), 3239 (Vi), s.n. [Shepherd, 25-6-15] (Ur); A. R. Moldenke 835 (Lw). Rock Island Co.: E. T. Harper s.n. [Port Byron, 1893] (Io--133475). Saint Clair Co.: E. W. Andrews 1539 (Ur); J. Neill 291 (Il--22978). Sangamon Co.: Ahles 4590 (Ur); G. D. Fuller 1366 (Il--15791), 4194 (Il--15797), 4276 (Il--15896), 4499 (Il--15902), 4590 (Il--15906), 4613 (Il--15910), 4660 (Il--15911), 4700 (Il--15885), 4742 (Il--15904), 4799 (Il--15886), 4821 (Il--15782), 4880 (Il--15912), 4948 (Il--15888), 5024 (Il--15897), 5066 (Il--15908), 5117 (Il--15783), 5144 (Il--15889), 5195 (Il--15887), 5244 (Il--15898), 5348 (Il--15787), 5470 (Il--15786), 5571 (Il--15788), 5591 (Il--15918), 5654 (Il--15909), 5691 (Il--15780), 5845 (Il--15890), 5881 (Il--15784), 5974 (Il--15785), 6006 (Il--15899), 6098 (Il--15891), 6319 (Il--15781), 6385 (Il--15789), 8792 (Il--15913); L. B. Mead s.n. (Ca--216738); A. R. Moldenke 823 (Lw); A. B. Seymour s.n. [Springfield Junction, 8 July 1879] (H--106464). Scott Co.: A. Flynn 14239 (Il--25153); A. R. Moldenke 831 (Lw, Ut). Shelby Co.: G. D. Fuller 13090 (Il--23753). Stark Co.: V. H. Chase s.n. [July 10, 1896] (Ur, Ur). Stevenson Co.: Serf 9833 (Il--15915), 9869 (Il--15916). Tazewell Co.: V. H. Chase 4174 (Ur). Union Co.: Collector undesignated s.n. [Aug. 1, 1879] (Cm); G. D. Fuller 667 (Ur); Fuller & Fisher 667 (Il--15795). Vermilion Co.: Storm s.n. [July 28, 1949] (Ur, Ur); Winterringer 6520 (Il--33773). Wabash Co.: Schneck s.n. [Sept. 1, 1887] (Ur), s.n. [July 25, 1897] (Ur), s.n. [July 1900] (Ur); Shearer s.n. [Mt. Carmel, July 6, 1900] (Vi). Whiteside Co.: Ahles 4211 (Ur); G. D. Fuller 13662 (Il--31212); Winterringer 8167 (Il--37438). Will Co.: Umbach s.n. [Romeo, Aug. 25, 1897] (Mi, W--339480). Winnebago Co.: M. S. Bebb 9285 (Bz--23789), s.n. [Fountaindale, 1867] (Cm); E. W. Fell 51309 (Il--38606), 51327 (Il--38588), 51340 (Il--38616), 52660 (Il--38883); Fuller & Haime 15f (Il--15792), 2179h (Il--15894); W. H. Rhoades s.n. [Rockford] (Hs); Swezey s.n. [Pecatonica] (Gg--31416). Woodford Co.: V. H. Chase 9693 (Ur), 9963 (Ur), 9990 (Au--122715, St, Ur, Ur). Stony Island: H. H. Smith 5645 (Ca--882826), 6028 (Ca--882825). County undetermined: H. H. Babcock s.n. [Aug. '69] (Br); M. S. Bebb s.n. [Central Illinois, 1867] (Bm); J. Blake s.n. [Illinois] (S); Buckley s.n. [1837] (T); Collector undesignated s.n. (Gg--31414); Fink s.n. [Blackberry, July 28, 1892] (Io--28699); Short s.n. [Dry prairies] (T); J. Torrey s.n. [Illinois] (Pr); G. R. Vasey 4 (Il--16006), s.n. (Ms).

INDIANA: Carroll Co.: C. C. Deam 15345 (In). Clay Co.: W. M.

Rhoades s.n. [Spencer, July 1931] (Up). Daviess Co.: Tewell s.n. [Washington, 19 June 1936] (Fl--25879). Elkhart Co.: C. C. Deam 21001 (In); Friesner 15874 (Bt—54747). Floyd Co.: C. C. Deam 41547 (In). Fulton Co.: C. C. Deam 42167 (In); Friesner 13655 (Bt—46926). Gibson Co.: C. C. Deam 25506 (In); Schneck s.n. [July 1888] (In). Greene Co.: C. C. Deam 25657 (In); Friesner 6513 (Bt—14217); Kramer & Johnson s.n. [July 16, 1941] (Ok); W. Rhoades s.n. [near Marco, July 1927] (Bt--29294, N). Hamilton Co.: Friesner 6043 (Bt--13455, Ca--540466, Lb--13646, Po--201415, Sd—23983). Harrison Co.: C. C. Deam 20357a (In), 41498 (In). Hendricks Co.: S. M. Deam 13675 (In). Howard Co.: Ek s.n. [7-9-1938] (Bt--56734). Jasper Co.: C. C. Deam 42088 (In); Friesner 14611 (Bt--50862); Welch s.n. (In--5838, In--5839). Jefferson Co.: J. M. Coulter 14 (Vt). Jennings Co.: C. C. Deam 11253 (In); Hendricks s.n. [August 7, 1941] (Hi--24737). Knox Co.: C. C. Deam 29283 (In); Friesner 7923 (Bt--20358, Gg--237861, H--27372); S. McCoy 630 (Dp--4674), 4233 (Lb--43727). Kosciusko Co.: C. C. Deam s.n. [northeast of Winona Lake, August 2, 1897] (In, W--493309); Friesner 15436 (Bt--54877). Lagrange Co.: C. C. Deam 14980 (In), 31309 (In); Friesner 15621 (Bt--54608). Lake Co.: R. Bebb 1682 (Ok); F. W. Johnson 348 (N); Lansing 2810 (W--753094). LaPorte Co.: C. C. Deam 31426 (In). Lawrence Co.: Kriebel s.n. [7-3-33] (Bt--19475); Weatherwax s.n. (In--2404); Wynn 89 (Au). Marion Co.: H. H. Bartlett s.n. [July 13, 1903] (Mi); C. C. Deam 6957 (In); H. F. Dietz s.n. [Fall, 1910] (Du--9542); Friesner 16956 (Bt--62249, St--23607, We), s.n. [Pleasant Run & Brookville Rd., 7-1-25] (Bt--2471). Marshall Co.: C. C. Deam 45070 (In); Evermann 970 (W—357804); W. H. Rhoades s.n. [Plymouth] (Hs); Scovell & Clark 970 [35] (Du--9538). Martin Co.: C. C. Deam 11383 (In). Miami Co.: Ek s.n. [near Bunker Hill, 8-16-1936] (Bt—42529). Monroe Co.: V. Davis s.n. [Bloomington] (In--2287); Lewis & Brown s.n. [Bloomington, Aug. '06] (Au). Montgomery Co.: C. C. Deam 17621 (In). Newton Co.: C. C. Deam 18108 (In); Friesner 14703 (Bt--50598, Ky, N, Pl—132318, We); H. Hahn s.n. [Roselawn, 1905] (W--609230); M. McKee 1404 (Dp). Owen Co.: S. M. Deam 8952 (In); W. H. Rhoades s.n. [Spencer, July 1931] (Hs, N), s.n. [near Spencer, July 1931] (N); Weatherwax s.n. [Spencer] (In—1042). Parke Co.: Daubenmire s.n. [7/7/30] (Bt—6068); Disbrow s.n. [Silverwood, Sep. '03] (Nm); W. H. Duncan 194 (H—2494). Pike Co.: C. C. Deam 16965 (In). Porter Co.: C. C. Deam 31560 (In); F. W. Johnson 348 (N); Tryon 1519 (H--103045). Posey Co.: S. A. Cain 484 (No--31721); C. C. Deam 16813 (In); W. H. Welch 6929 (Bl—42346, Ca--892820, Dp—14547, We). Pulaski Co.: Friesner 22373

(Au--122723, N, Ok, S). Putnam Co.: Banker 1361 (N); S. M. Deam 13490 (In); Friesner 7105 (Bt--14854); Grimes 164 (Dp); McDougal s.n. [7-30-89] (Dp, Dp); Yuncker 3677 (Dp). Saint Joseph Co.: C. C. Deam 49230 (In). Starke Co.: C. C. Deam 17954 (In), 31835 (In); Friesner 16311.5 (Bt--56415); W. H. Rhoades s.n. [near Knox] (Hs). Steuben Co.: C. C. Deam 54226 (Dm). Sullivan Co.: Craw s. n. [July 4, 1930] (Bt--5283); C. C. Deam 7307 (In). Tippecanoe Co.: Cummins s.n. [Battleground, July 2, 1936] (Ah); C. C. Deam 17689 (In); Dorner 102 (Pu), 248 (Pu), s.n. [near Lafayette, 1900] (In); Ek s.n. [8-1-1940] (Bt--56621); Erisman s.n. [LaFayette, Aug. 25, '94] (Ah); Foster s.n. [Wea Bottoms, 10/17/01] (Pu). Tipton Co.: Ek s.n. [8-5-1942] (Bt--64498). Vermillion Co.: C. C. Deam 11946 (In). Vigo Co.: C. C. Deam 25762 (In); Friesner 6666 (Bt--14461, Bt--14525); Mohr & Mohr s.n. [Terrehaut, 1884] (W--771851). Wabash Co.: C. C. Deam 53985 (Dm). Warren Co.: C. C. Deam 9740 (In), 11903 (N); Friesner 11014 (Bt--38616). Wayne Co.: Creek 160 (Ea); C. C. Deam 13585 (In); L. J. King 1663 (Ea), 1664 (Ea), 2620 (Ea); "M. B." 156 (Ea). White Co.: C. C. Deam 39359 (In). County undetermined: Dorner s.n. [9/28/99] (Ur); A. Wood s.n. [Ind.] (Pa). IOWA: Adair Co.: A. R. Moldenke 937 (Lw); H. N. Moldenke 21939 (Lw). Adams Co.: Dunn & Isely 5707 (W--2099962). Allamakee Co.: L. H. Pammel s.n. [New Albin, Aug. 6, 1918] (Io--94219); Shimek s.n. [Aug. 13, 1917] (Ur); Tolstead s.n. [Hanover Twp., July 15, 1933] (Ca--882818), s.n. [Hanover Twp., Aug. 9, 1933] (Io--144282). Appanoose Co.: L. H. Pammel s.n. [Moravia, Oct. 1914] (Io). Benton Co.: A. R. Moldenke 977 (Lw). Black Hawk Co.: Burk 527 (Ur); L. H. Pammel 673 (Io--119243), s.n. [Cedar Falls, Aug. 13, 1908] (Io--78234). Boone Co.: Collector undesignated s.n. [Aug. 1937] (La); J. V. Ellis 155 (Io--54363). Carroll Co.: L. H. Pammel s.n. [Coon Rapids, June 26, 1921] (Io--99924). Cass Co.: A. R. Moldenke 934 (Lw). Cedar Co.: Fay 688 (Hi--123798), 852 (Ca--965065), 970 (Vi). Cerro Gordo Co.: A. Hayden 1, in part (N), s.n. [October 15, 1934] (N); L. H. Pammel s.n. [Willow Cr., Sept. 20-23, 1902] (Io--28203). Cherokee Co.: L. H. Pammel s.n. [Cherokee, IX.5.1920] (Io--98223). Chickasaw Co.: L. H. Pammel s.n. [Lawler, July 1919] (Io--94013). Clarke Co.: Pammel & Pammel s.n. [Osceola, Sept. 26, '24] (Io--114346). Clay Co.: A. Hayden 3005 (Io--149006), 3007 (Io--148885); W. A. Weber 1272 (Bl--48176). Clayton Co.: A. R. Moldenke 991 (Lw); Pammel & Pammel s.n. [McGregor, Aug. 1924] (Io--114871). Clinton Co.: L. H. Pammel s.n. [Comanche, Sept. 13, 1918] (Io--95170), s. n. [Dewitt, Sept. 10, 1924] (Io--114397). Dallas Co.: L. H. Pammel s.n. [Dawson, Aug. 16, 1918] (Io--95628). Decatur Co.: J. P. Anderson s.n. [July 11, 1903] (Io--52108). Delaware Co.: A. R.

Moldenke 987 (Lw). Des Moines Co.: L. H. Pammel 735 (Io--118882), 961 (Io--119553). Dickinson Co.: W. B. Fox 7 (We); Gier s.n. [June 21, 1952] (Je--7173); Mrs. L. Jones s.n. [June 24, 1928] (Ob--83155); Pammel & Pammel s.n. [Arnold's Park, 7-23-13] (Io--73719); C. M. Roberts s.n. [Spirit Lake, Aug. 1920] (Io--97107), s.n. [5/25/23] (Cm). Emmet Co.: Cratty s.n. [13 July 1886] (Ob--50835), s.n. [Armstrong, August] (Io--92218); W. H. Welch 9700 (Au--122739). Fayette Co.: Fink 251 [July 12, 1894] (W--214893), 251 [Sept. 4, 1894] (W--214893), s.n. [Fayette, 7-18-1894] (Io--26816, Io--31575); J. R. Gardner 583 (N). Floyd Co.: Arthur s.n. [Charles City, July 13, 1872] (Ah), s.n. [Charles City, July 16, 1872] (Ah), s.n. [Charles City, 7/15/74] (Ah). Fremont Co.: Deer s.n. [southwest corner of the state, Aug. 1934] (Cm); L. H. Pammel 704 (Io--119300), s.n. [Hamburg, Jul. 14, 1923] (Io--111220); W. H. Rhoades s.n. [Hamburg, Aug. 1928] (Hs). Greene Co.: L. H. Pammel s.n. [Jefferson, June 26, 1921] (Io--95859). Hamilton Co.: L. H. Pammel s.n. [Stratford, Jul. 13, '24] (Io--115186); Pammel & Zimmerman 306 (Io--119090). Harrison Co.: Collector undesignated s.n. [Dunlap, July 1925] (Nj); Fay 3714 (Vi); L. Kellogg s.n. [Halsted's Am. Weeds 174] (Ah, C, Fc, Io--15352, Mi, Ua--11397, Ur, Vt, We); Rigg s.n. [June23, 1898] (Se--14954). Humboldt Co.: Hask s.n. [Humboldt, May 21, 1902] (Io--22917). Iowa Co.: Easterley 729 (We); A. R. Moldenke 972 (Lw). Jasper Co.: Elrod s.n. [Prairie City, July 7, '85] (Mn--18071). Jefferson Co.: L. H. Pammel s.n. [Fairfield, Sept. 1919] (Io--95191). Johnson Co.: Loufek s.n. [June 1938] (Io--147639, N); McConaha s.n. [August 1935] (Bt--39041); Somes 3489 (W--672272). Kossuth Co.: E. B. Watson s.n. [Algona, 9-5-02] (Io--74134). Lee Co.: R. A. Davidson 2269 (W--2235821); Fults 1089 (Io--138822); Shimek s.n. [July 15, 1928] (Ur). Linn Co.: A. R. Moldenke 980 (Lw). Louisa Co.: R. A. Davidson 858 (W--2261035); L. H. Pammel s.n. [Fredonia, June 1927] (Io--129476). Lyon Co.: C. R. Ball s.n. [Little Rock, June 30, 1897] (Io--15325); L. H. Pammel s.n. [Granite, Sept. 1, 1920] (Io--97830); Shimek s.n. [Aug. 26, 1910] (N). Madison Co.: A. R. Moldenke 940 (Lw). Marion Co.: A. R. Moldenke 956 (Lw). Mehaska Co.: Augustine 261 (Ok); A. R. Moldenke 957 (Lw). Mills Co.: Fay 3593 (Hi--126891); A. R. Moldenke 924 (Lw, Ut, Z). Mitchell Co.: Tuttle 31a (Io--74177). Monona Co.: L. H. Pammel s.n. [Onawa, Jul. 13, 1923] (Io--109650). Muscatine Co.: Estle & Brown s.n. [south of Muscatine, summer 1935] (Io--146363); L. H. Pammel s.n. [Jul. 20, 1919] (Io--95283); Shimek s.n. [Oct. 14, 1919] (Ur). O'Brien Co.: Yuncker & Welch 4110 (Dp). Palo Alto Co.: Cratty s.n. [West Bend, Jul. 10, 1919] (Io--96078); W. A. Weber 1261 (Bl--48175, Io--150767). Polk Co.: Bakke s.n. [Des Moines, 9-21-12] (Io--

53554, Io--74062); Mosier s.n. [Des Moines, June 11, 1894] (W--859086); L. H. Pammel s.n. [Des Moines, Aug. 3, '27] (Io--129878, Ok--10367, St--9269). Pottawattamie Co.: Demaree 23662 (Sm); Fay 3128 (Ca--45357); A. R. Moldenke 930 (Lw); L. H. Pammel s.n. [Oakland, Aug. 27, 1919] (Io--96584). Poweshiek Co.: M. E. Jones s.n. [Grinnell, Aug. 1877] (Al, Ca--380556, Cm, Du--176622, Gg--164169, N), s.n. [Grinnell, Aug. 8, 1877] (Du--151777, Po--70872); A. R. Moldenke 963 (Lw); L. H. Pammell s.n. [Grinnell, Aug. 24, 1930] (Io--136710). Story Co.: Arthur s.n. [Ames, July 25, 1877] (Ah, Ah); C. R. Ball s.n. [Ames, June 30, 1898] (Io--15331); C. E. Bessey s.n. [Ames, 1880] (Io--95122), s.n. [Ames] (Io--15327); Beyer s.n. [Ames, August 1887] (Io--45076); J. R. Campbell 36 (Io--84556); Carver s.n. [Ames] (Io--15328); P. Clayton 11 (Io--84559, Io--84560); Cratty s.n. [Ames, Jul. 29, 1925] (Io--117338); H. S. Fawcett 39 (Fl--21123, Io--52791, Io--76859, N, W--493414); Featherly s.n. [June 24, 1924] (St--9260); Haven s.n. [Sept. 1st, 1888] (Ob--50839); A. Hayden s.n. [August 10, 1933] (N); A. S. Hitchcock s.n. [Ames, July '82] (Io--15322), s.n. [Ames, 7/31/89] (Io--15323), s.n. [Ames, 1889] (Io--15329); Jeffs s.n. [7/10/1907] (Ok-10364), s.n. [Ames, 1907] (Io--75062); Kolpin 38 (Bm); L. H. Pammel 85 (Fc, Fl--21126, N, W--280242), s.n. [Ames, August 29, 1896] (Io--15330), s.n. [Ames, Sept. 1913] (Io--57775); Pammel & Cratty s.n. [Colo, Jul. 4, 1922] (Io--105536); Pammel & Pammel 61 (Io--50246, Io--84558); Stafford s.n. [Ames, 1906] (Io--82082); E. B. Watson s.n. [Ames, 7-4-02] (Io--82978); W. A. Weber 467 (Bl--48177). Wapello Co.: L. H. Pammel s.n. [Ottumwa, Jul. 12, 1919] (Lo--93791). Warren Co.: H. N. Moldenke 21940 (Lw). Webster Co.: Paige s.n. [Fort Dodge] (Io--131043). Winneshiek Co.: Goddard s.n. [6-28-95] (Io--72020); Holway s.n. [Decorah, July 20, 1884] (Up--17123). Woodbury Co.: C. R. Ball 2439 (Io--121579); L. H. Pammel s.n. [Sioux City, July 7, 1919] (Io--97279). Wright Co.: Whited 2359 (Or--12378). County undetermined: Suksdorf s.n. [July 20. 1873] (Pl--138359).

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BOOK REVIEW

Alma L. Moldenke

"The Life of Plants", by E. J. H. Corner, xii + 315 pp., illustr. World Publishing Company, New York, N. Y. 1964. $12.50

How wonderfully thought-provoking, fascinatingly readable and botanically valuable this book is! It should become required reading for all who have any interest in botany. Despite the fact that the author has "lopped off most physics, chemistry,

physiology, genetics and anatomy" there is still an excellent text developed with fine illustrations, chapter references, bibliography and index.

Because my feeble wording may not do the book justice, I will include short quotes from a few of the chapters.

PREFACE: "land plants are understood as seaweeds selected from the great multiplicity of thalassiophytes, dried off on the surface, waxed against evaporation, rooted, piped for water flow, built up with the transparent bricks made from the excess of sugars, yet still reproduced by seaways."

THE BREAKING WAVE: "In contrast with the plant plankton of free cells, the seaweeds form the plant benthos of many-celled, attached, and mortal individuals. The begin the concept of vegetation."

MAKING VEGETATION: "Thus the plant body (seaweed) comes to enlarge.....at its tips where also light supply and water movement renewing the supply of mineral salts are maximal. The tendency to apical growth, away from the rock, so evident for a single cell in competition for foothold and for light, fits the mechanical needs of the larger seaweed. It is inherited by land plants living under conditions so dissimilar that many of the most advanced, such as grasses and thistles, convert it as best they can into basal growth of the leaves."

LIVING SEAWEEDS: "In clothing the rocks the seaweeds have altered the shore. Whether floated by the rising tide or prostrated in its falling, they shade and shelter. Under, around, and upon them spring up new situations to be exploited by other seaweeds and by animals, and they in their turn create their situations for smaller organisms....Every growth makes as a fixture for some time, a micro-habitat with a micro-climate where micro-organisms survive."

REPRODUCTION AND WASTAGE: "Parasitic seaweeds are rare. Many small seaweeds grow epiphytically on others but they do not penetrate the tissues of the supporting plant and derive organic nourishment therefrom in the manner of mistletoes. Seaweeds seem remarkably antibiotic, or they are not prone to relinquish their photosynthetic independence."

THE LAND PLANT: With a description of a tropical forest as the botanical culmination in land vegetation: "There is a giant tree, pre-eminent in a forest that stretches to the skyline. On its canopy birds and butterflies sip nectar. On its branches orchids, aroids, and parasitic mistletoes offer flowers to other birds and insects. Among them ferns creep, lichens encrust, and centipedes and scorpions lurk. In the rubble that falls among the epiphytic roots and stems, ants build nests and even earthworms and snails find homes. There is a minute munching of caterpillars and the

silent sucking of plant bugs. On any of these things, plant or animal, fungus may be growing. Through the branches spread spiders' webs. Frogs wait for insects, and a snake glides. There are nests of birds, bees, and wasps. Along a limb pass wary monkeys, a halting squirrel, or a bear in search of honey; the shadow of an eagle startles them. Through dead snags fungus and beetle have attacked the wood. There are fungus brackets nibbled round the edge and bored by other beetles. A woodpecker taps. In a hole a hornbill broods. Where the main branches diverge, a strangling fig finds grip, a bushy epiphyte has temporary root, and hidden sleeps a leopard. In deeper shade black termites have built earthy turrets and smothered the tips of a young creeper. Hanging from the limbs are cables of lianes which have hoisted themselves through the undergrowth and are suspended by their grapnels. On the swinging stems grows an epiphytic ginger whose red seeds a bird is pecking. Where rain trickles down the trunk filmy ferns, mosses, and slender green algae maintain their delicate lives. Round the base are fragments of bark and coils of old lianes, on which other ferns are growing. Between the buttress-roots a tortoise is eating toadstools. An elephant has rubbed the bark and, in its deepened footmarks, tadpoles, mosquito larvae, and threadworms swim. Pigs squeal and drum in search of fallen fruit, seeds, and truffles. In the humus and undersoil, insects, fungi, bacteria, and all sorts of 'animalculae' participate with the tree roots in decomposing everything that dies.

"This tree is not alone. The forest consists not solely of its kind, nor even of a few, but of hundreds, each with its specific size, shape, bark, leaf, flower, fruit, and wood attractive to its particular following of green plants, fungi, and animals. Thus comes the richness of these forests, most prolific in natural history, and thence sprung the superiority of the creatures that intelligently traverse them."

THE UPWARD STRUGGLE: "The home of palms, screw pines, banana-allies, and other pachycaul monocotyledons is the swampy flood zone of tropical rivers, where on newly forming soil they seem to show how the flowering forest was pioneered."

THE SEED: "Of the four great inventions of land plants, namely internal air spaces between the cells, cuticle, lignin, and seeds, they are geologically the latest and by far the most complicated."

THE FRUITING TREE: "From such arillate fruits (durian) all other kinds have been derived by loss of the aril, by drying up into the rattling pod or capsule with its dry seeds, by indehiscence leading to the general succulence of berries, by increasing lignification leading to stone fruits and nuts, and by decreasing size leading to small editions of all kinds."

THE FUNGUS: "They have explored by means of their hyphae the dead world more effectively than any other kind of organism. In numbers they are the counterparts of insects."

FUNGUS PROGRESS: "Top soil is the gold in the basement of the forest.....First in tropical soils come the termites. In armies from earthen barracks they speedily organize on their six-legged carriages batteries of jaws which fracture and comminute the material; in their insides they can digest lignin. They generally work at night, when their munching can be heard. Thus trunks may vanish before fungus or beetle had been able to work on them. Then, various insect grubs, woodlice, millipedes, snails, and slugs rasp at the remains that the termites have left; earthworms tug pieces into their burrows where they soften by bacterial action and are worked eventually through the worm. The fungi grow more slowly on all and sundry, but their chemistry is far more varied and they reduce to edibility such material as bark, which is not at first palatable. The animals excrete, defaecate, and leave slimy tracks. The fungus excretes and leaves tracks of threads. Bacteria multiply on these. Protozoa multiply on the bacteria. Rotifers, nematodes, and other minute animals multiply in these soil colonies and add their excretions. Beetles, spiders, centipedes, and scorpions prey on the soil animals and add their quota of waste products, all of different chemistry. Fungus spores abound, germinating and ungerminated, and on these microscopic eggs many protozoa, rotifers, and mites feed. A mouldy smell, compounded mainly of the many fungus odours, marks the solid, liquid, and gaseous decomposition in this microcosm of chemical engineering."

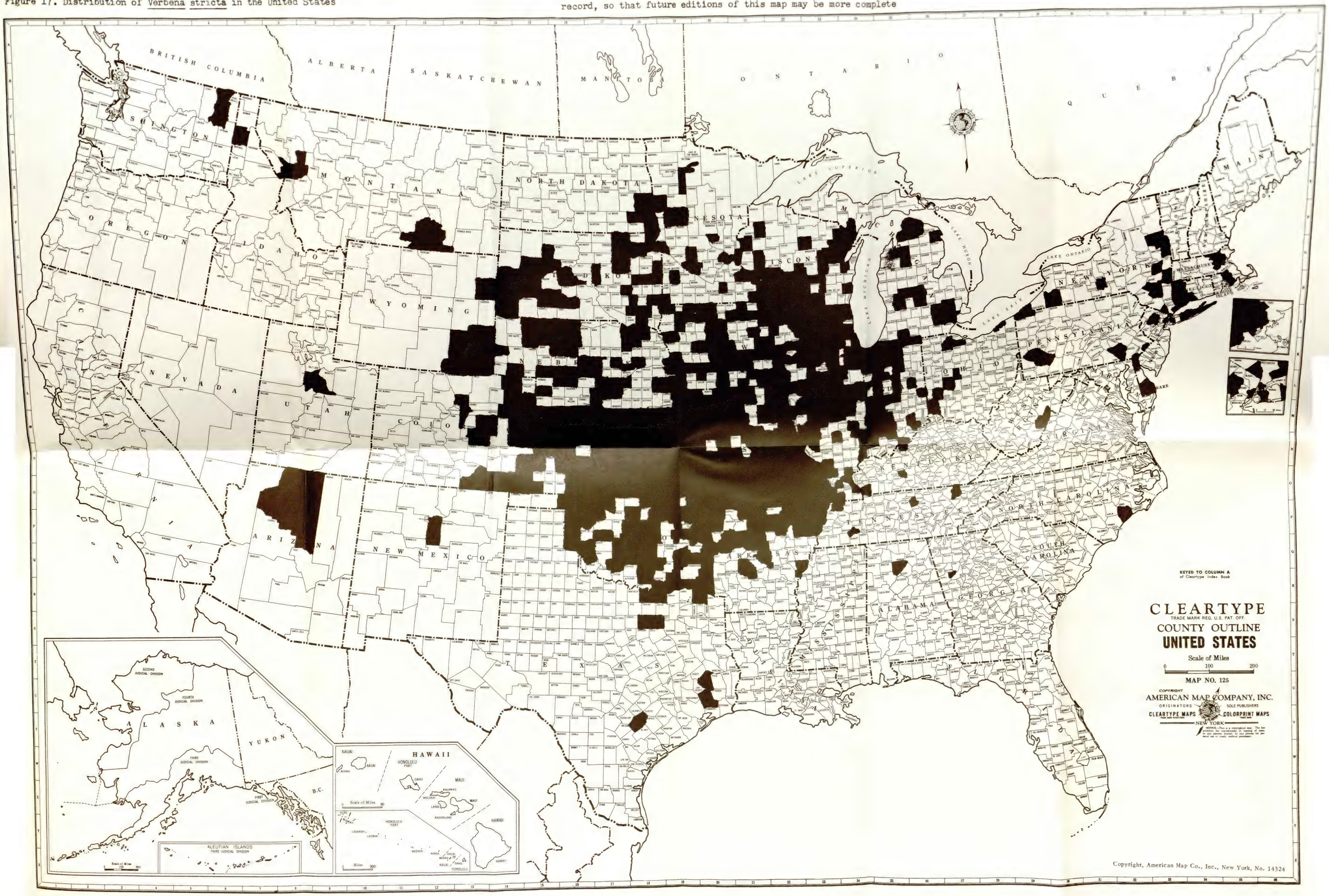
BEYOND THE FOREST: "From all over the earth -- tundra, desert, steppe, mountain, ocean island, and lake -- we gather the threads of plant life on land, and we trace them in the canopy of the forest, which first fitted plants for their life in the desert and on the mountain, down to the beginnings of trees flowering, fruiting, seeding, and even sporing on the river flats. Too little is known of these places, where the detritus of the land began to consolidate and its plants to root. There will be time enough to learn about the ocean, where the plant-cell evolved, and there will probably be time enough to learn about the seashore where this cell grew into the plant form. But the forests, which show how trees were made, are going. They are vanishing nowhere faster than from the alluvial plains where the vestiges of the last creative phase of plant life, that prepared the way for the modern world, may survive. The modern mouth is the people's, and theirs the new retaliation. Before machines the forest is defenceless. Human progress is clearing it with gathering speed to plant crops of quick returns. The botanist must hurry if he would take the opportunity that a few brief centuries of his science have revealed; for soon there will be rice-field to every river-brink. The unmindful tree begot, indeed, the seed of its own destruction."

I hope that many botanists will second effectively Dr. Corner's claim that "We need a new generation of alert young biologists eager to enquire into the lives of plants. Laboratories are the studies, not the prisons, of research."

Figure 17. Distribution of Verbena stricta in the United States

Herbarium curators who have material of this species from additional counties are asked to send it to the author for verification and record, so that future editions of this map may be more complete

Mapping by counties done by Andrew R. Moldenke



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CHROMOSOME NUMBERS OF THAILAND COMPOSITAE

by

R. M. King
Washington, D. C., U. S. A.

I would like to report chromosome counts for 15 collections representing 8 species of Compositae collected in Thailand during the summer of 1963. Buds were collected in the field in 4 parts chloroform, 3 parts absolute alcohol and 1 part glacial acetic acid. These were air mailed to Prof. B. L. Turner, the University of Texas, Austin, Texas, who made the meiotic counts following staining procedures using acetocarmine. Voucher specimens are deposited at the United States National Herbarium, Smithsonian Institution and in the Herbarium, the University of Texas.
This study was supported, in part, by a government grant to B. L. Turner (N.S.F. GB 1216).

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TABLE 1.--Chromosome numbers of Thailand Compositae.

Species	n=	Voucher Collection (by Province)	Previous Count n=	Reference To Previous Count
Ageratum conyzoides L.	20	Nakhon Rat Sima, King 5528	20	Turner & King, 1964
Ageratum conyzoides L.	20	Nakhon Nayok, King 5537		
Ageratum conyzoides L.	ca. 20	Ranong, King 5574		
Ageratum conyzoides L.	20	Ranong, King 5577		
Ageratum conyzoides L.	20	Ranong, King 5584		
Erigeron (Conyza) sumatrensis Retz.	ca. 27	Prachuab, King 5567		
Eupatorium sp.	10	Pranakorn, King 5597		
Gnaphalium luteo-album ssp. affine (D. Don.) Koster	7	Chieng Mai, King 5469	7	Darlington & Wylie, 1956; Cave, 1960
Gynura pseudochina (L.) DC.	10	Kamphaeng Phet, King 5438		
Synedrella nodiflora (L.) Gaertn.	ca. 20	Nakhon Rat Sima, King 5524	19	Cave, 1962
Vernonia patula (Dry.) Merr. var. patula	9	Pranakorn, King 5563		
Wedelia biflora (L.) DC.	15	Pranakorn, King 5555	15	Chuang et al., 1962
Wedelia biflora (L.) DC.	15	Pranakorn, King 5556		
Wedelia biflora (L.) DC.	15	Pranakorn, King 5596		

MATERIALS TOWARD A MONOGRAPH OF THE GENUS VERBENA. XXVI

Harold N. Moldenke

VERBENA STRICTA Vent.

Additional bibliography: Parks & King, El Crisol [Puerto Rico] 4: 74—80. 1950; Chem. Abstr. 45: 3037. 1951; M. L. Buch, U. S. Dept. Agr. Handb. 64: 13. 1960.

Parks & King (1950) and Buch (1960) report the occurrence of ursolic acid throughout this plant.

Additional citations: KENTUCKY: Ballard Co.: Anderson & Mc Farland 253 (Ky); McFarland & Anderson 253 (Vi), s.n. [Wickliffe, Aug. 16, 1923] (S). Campbell Co.: Van Cleve s.n. [Dayton] (Ky). Edmonson Co.: Lix 454 (W—1948092). Fulton Co.: Biltmore Herb. 3653a (N). Hickman Co.: H. A. Gleason 8978 (N). Kenton Co.: E. L. Braun s.n. [Devon Park] (Cn). Marshall Co.: Eggleston 4837 (N). TENNESSEE: Chester Co.: S. M. Bain 328 (C). Obion Co.: Jennings & Jennings s.n. [Reelfoot Lake, 1924] (Cm). Smith Co.: Gattinger s.n. [Hickman] (W—147589). MICHIGAN: Alpena Co.: Cain, Raymond, & Kucyniak 583 (Go, Mg, S, Vi). Charlevoix Co.: J. H. Ehlers 642 (Mi, Po—63839). Cheboygan Co.: J. H. Ehlers 5165 (Mi), 5613 (Ca—882816, Mi); E. G. Voss 1038 (Mi), 1315 (Mi). Clinton Co.: Scholes & Rafferty RL.97 (Mi). Emmet Co.: J. H. Ehlers 2453 (Mi), 3489 (Hi—143745, Mi), 4856 (Ca—498895, I), s.n. [W. of Pellston, July 1923] (Ka—68122); F. C. Gates 14450 (Ka—70014). Grand Traverse Co.: Dieterle 1850 (Mi, S). Gratiot Co.: C. A. Davis s.n. [Elwell, Sept. 1900] (Mi, Mi). Kalkaska Co.: H. N. Moldenke 21944 (Lw). Kent Co.: Bazuin 2232 (Mi); Mullikan s.n. [July 19, 1897] (Mi); Parmelee 826 (Au—191548). Livingston Co.: F. J. Hermann 9159 (Mi, N). Menominee Co.: Grassl 2750 (Mi, N). Missaukee Co.: E. G. Voss 3065 (Mi). Montcalm Co.: A. R. Moldenke 1033 (Lw). Oakland Co.: Farwell 6359 (Mi). Saint Joseph Co.: G. L. Fisher s.n. [July 2, 1923] (S). Washtenaw Co.: Dodder s.n. [July 1931] (Ok—10365); Frickelton s.n. [July 13, 1931] (Ok—10366). Wayne Co.: F. C. Schmid s.n. [Romulus, August 1, 1943] (Mi). WISCONSIN: Adams Co.: R. T. Brown 117 (Ws); J. W. Thomson s.n. [Aug. 15, 1937] (Ws). Brown Co.: Shinners 3798 (Ws). Buffalo Co.: H. H. Smith 7113 (B, Ws). Columbia Co.: Alberts s.n. [Sept. 29, '45] (Ws); Rob. Burton 124 (Ws); H. P. Chandler 349 (Ca—25189); Fernholz s.n. [Aug. 18, 1930] (Ws); H. K. Henry 109 (Up); Lemke 84 (Ws); Orpunt s.n. [7/5/49] (Ur); H. L. Russell s.n. [Sept. 4, '85] (Ws); F. J. W. Schmidt s.n. [Oct. 1, 1934] (Ws); F. C. Seymour 10280 (Ws); H. H. Smith 8034 (B, Ws); J. Wright s.n. [September

29, 1945] (Ws, Ws). Crawford Co.: Fassett 9788 (Um--205, Ws); H. W. Graham s.n. [July 9, 1928] (Cm); D. Marsh s.n. [September 21, 1959] (Ws); A. R. Moldenke 993 (Lw); Pammel & Pammel s.n. [Prairie du Chien, Aug. 8, 1929] (Io--133834); H. H. Smith 7454 (B, Ws); R. Sprague s.n. [7/4/26] (Cn, Cn); Ugent s.n. [July 25, 1960] (Ws). Dane Co.: C. C. Albers 33014 (Au), 34007 (Au); Bakken 122 (Ws); Botany 162 Class s.n. [Sept. 28, 1935] (Ws); L. S. Cheney s.n. [July 23, 1888] (Ws); H. M. Clarke s.n. [Sept. 4, 1957] (Ws, Ws); Greeley s.n. [Madison, July 3, 1949] (Ca--903546); Grether 8189 (Ws); Heddle 2421 (Ws), 2678 (Ws), 2728 (Io--109880); Koeppen 117 (Ws), 120 (Ws); Lapham s.n. [1858] (Ws); McCabe s.n. [27 July 1945] (Ws), s.n. [13 August 1945] (Ws); A. R. Moldenke 1012 (Lw); Monroe s.n. [October 10, 1959] (Ws); Reinert s.n. [10/8/59] (Ws); Schlising & Musolf 60-111 (Ws); A. B. Seymour 1063 (H--107722, Ur, Ws); Shinners 2439 (Ca--882819); H. L. Smith s.n. [July 27, 1885] (Ws), s.n. [July 27, 1887] (Ws); Ugent s.n. [July 31, 1960] (Ws); Van Arsdel s.n. [17 September 1952] (Ws); P. B. Whitford 1821 (Ws). Dunn Co.: Weinzirl s.n. [Jy. 23, 1894] (Ws). Grant Co.: Iltis 9448 (Ws); Iltis & Salaman 10103 (Ws); A. R. Moldenke 996 (Lw); L. H. Pammel s.n. [Muscoda, Aug. 15, 1930] (Io--136579); Shimek s.n. [Aug. 11, 1921] (Ws); H. H. Smith 7806 (B, Ws); Sylvester 101 (N); Ugent s.n. [July 25, 1960] (Ws). Green Co.: E. W. Fell 58-467 (Ws), 58-611 (Ws). Green Lake Co.: A. R. Moldenke 1017 (Lw). Iowa Co.: Iltis s.n. [end of June 1957] (Ws); A. R. Moldenke 1001 (Lw); Wills s.n. [July 27, 1957] (Ws). Jackson Co.: Grether 6613 (Ws). Jefferson Co.: Shinners 2400 (Ws); Wadmond 3769 (Dm), s.n. [Aug. 6, 1927] (Ws). Juneau Co.: Mearns 525 (W--670686); W. R. Taylor 2768 (Up--75581). La Crosse Co.: T. G. Hartley 1003 (W--2261909); King & Pammel s.n. [La Crosse, Aug. 26, 1901] (Io--22920); D. Pammel s.n. [La Crosse, 1902] (Io--22918); L. H. Pammel s.n. [La Crosse, Aug. 1882] (Io--15350); A. M. Peterson 187 (Ws); Ugent 433 (Ws). Lafayette Co.: Arnot s.n. [July 26, 1956] (Ws); Haggene, Melville, & Shaughnessy s.n. [Sept. 28, 1956] (Ws); P. K. Nelson s.n. [June 28, 1946] (Ws), s.n. [7 July 1946] (Ws); R. O. Wagner s.n. [Sept. 6, 1956] (Ws). Lincoln Co.: F. C. Seymour 12158 (Ws, Ws), 12263 (Ws). Marinette Co.: J. J. Davis s.n. [July 19, 1933] (Ws). Milwaukee Co.: J. S. Douglas s.n. [Wis.] (Je--3159). Monroe Co.: Iltis & Neess 8965 (Ws); A. M. Peterson 15 (Ws). Oconto Co.: Schlising & Schlising 1018 (Ws). Pepin Co.: O. Anderson 140 (Ws). Polk Co.: Patman, Long, & Struik 38 (Ws). Racine Co.: T. J. Hale s.n. (Ws); Shinners 4686 (Ws). Richland Co.: K. G. Foote s.n. [8-17-60] (Ws); M. A. Fosberg 337 (Ws). Rock Co.: R. B. Anthony s.n. [June 22, 1933] (Ws), s.n. [Sept. 26, 1936] (Ws); E. W. Fell 57-659

(Ws); Shinners s.n. [July 23, '89] (Ws); Wadmond 15734 (S); J. Wickham 14 (Ws), 37 (Ws). Sauk Co.: Cull 694 (Ws); Fassett 2689 (Ws); E. K. Jones s.n. [Aug. 22, 1948] (Ws); Koeppen 260 (Ws); Lemke 104 (Ws); H. H. Smith 7998 (B, Ws); Mrs. H. S. Young s.n. [July 2, 1936] (Cm). Shawano Co.: Honey s.n. [summer 1934] (Ws). Sheboygan Co.: Goessl s.n. [Sept. 1924] (Ws). Trempealeau Co.: Fassett & Wilson 9762 (In, Ws). Vernon Co.: H. H. Smith 7361 (B, Ws). Walworth Co.: Almon s.n. [Aug. 8, 1926] (Ws); Kleeberger s.n. [Whitewater, 8-25-1877] (Gg—31418). Washburn Co.: Goessl 8501 (B, Ws). Waukesha Co.: Fernholz s.n. [September 21, 1929] (Ws). Waupaca Co.: Goessl s.n. [July 28, 1910] (Ws); Rill s.n. [July 25, 1959] (Ws). Waushara Co.: Iltis, Bell, Melchert, Patman, & Witt 12469 (Ws); Pochmann s.n. [Sept. 1, 1959] (Ws). Wood Co.: L. S. Cheney 3647 (Ws). Blackhawk Island: Bramschreiber s.n. [June 30, 1959] (Ws). County undetermined: W. H. Chase s.n. [Wisconsin R. region, Aug. 1883] (Ws). MINNESOTA: Benton Co.: H. N. Moldenke 7785 (N). Big Stone Co.: Eifrig s.n. [Ortonville, July 20, 1929] (Up); Gier s.n. [Ortonville, VI.30.52] (Je—7183). Clay Co.: O. A. Stevens 1271 (Ca—952815, W—2034558, Wp). Clearwater Co.: Terrell 1789 (W—2388691). Fillmore Co.: J. L. Leedy s.n. [north of Rushford, June 29, 1937] (Bt—55364). Goodhue Co.: J. H. Sandberg 284 (B). Hennepin Co.: G. B. Aiton s.n. [Minneapolis, July '90] (N), s.n. [July] (Dt); F. H. Burglehaus 8466 (Se-14955); Chandonnet s.n. [Minneapolis, Aug. 22nd, 1910] (In); Eaton s.n. [Minneapolis, July 1890] (N); D. Houghton 29 (T); J. H. Sandberg 7566 (Fc), s.n. [Aug. 1879] (Ca—25172), s.n. [Aug. 1889] (Ca—25171, W—71935), s.n. [July 1891] (Dt); Schuette s.n. [St. Anthony, July 7, 1888] (N). Kandiyohi Co.: W. D. Frost s.n. [Willmar, July 1892] (Pl—22612, S, W—71936). Lyon Co.: L. H. Pammel s.n. [Marshall, Sept. 1918] (Io—94200). Ottertail Co.: Chandonnet s.n. [Perham, August 8, 1912] (Up—60537). Ramsey Co.: F. Blanchard s.n. [St. Paul, July 31, 1890] (Dt); Detwiler 8598 (La); Mearns 525 (W—649505, W—649506), s.n. [Fort Snelling, September 4, 1889] (W—670317). Renville Co.: C. MacMillan s.n. [Morton, July 1890] (Po—64647). Rock Co.: V. L. Harms 498 (Lw); P. Johnson 327 (Ky, Lb—36344). Waseka Co.: L. H. Pammel s.n. [Waseka, Aug. 1920] (Io—98732). Washington Co.: J. W. Moore 16667 (Ur), 16668 (We). Winona Co.: Hasse s.n. [Winona, July 1882] (N); Holzinger s.n. [Winona, Aug. '88] (Ca—199069), s.n. [Aug. 1901] (N, Vt); Hotchkiss & Jones 4164 (W—1622897). County undetermined: H. S. Young Jr. s.n. [8-10-1925] (Cm). NORTH DAKOTA: Cass Co.: O. A. Stevens s.n. [Fargo, July 25, 1934] (Ca—588086, Cm). Ransom Co.: O. A. Stevens s.n. [Lisbon, July 25, 1944] (W—2008469). Richland Co.: O. A. Stevens 318 (Ca—607217,

Hi—192047, N, Ok, Um--212). SOUTH DAKOTA: Brookings Co.: L. H. Pammel s.n. [Brookings, Jul. 30, 1922] (Io—106919); J. J. Thornber s.n. [Brookings, August 1893] (Tu). Brown Co.: Griffiths s.n. [July 31, 1872] (Pl—22613). Cherry Co.: Tolstead s.n. [July 15, 1935] (Io—145164). Custer Co.: Barr s.n. [July 25, 1940] (Ba, Se--95483); Degener & Peiler 16269 (N, N, N); Hayward 1697 (Se—77057); Tollefson 16 (Sd—25294). Day Co.: J. F. Brenckle 39-92 (N), s.n. [July 22, 1938] (B). Deuel Co.: J. F. Brenckle 4602 (N). Fall River Co.: J. W. Barnhart s.n. [Hot Springs, June 13, 1894; Herb. J. H. Barnhart 642] (N);Rydberg 932 (W—211121). Hanson Co.: G. F. Weber s.n. [Farmer, 8-18-27] (Fl—21120). Hutchinson Co.: V. L. Harms 459 (Lw). Hyde Co.: Pammel & Fink s.n. [Highmore, June & July 1912] (Io—79613). Kingsbury Co.: J. J. Thornber s.n. [Iroquois, 8/11/94] (Ca—124662). Lawrence Co.: F. L. Bennett 42 (Ua—43209); W. P. Carr 118 (N, W--751127); H. E. Hayward 202 (N); P. Johnson 254 (Bt—62384, Ky, Lb—36500, N, Ur); G. N. Jones 19746 (Ur). Meade Co.: Forwood 299 (W—317831); Kemp s.n. [Bear Butte] (C). Mellette Co.: Moses s.n. [White River] (Pr); Tolstead s.n. [July 9, 1935] (Io—145165). Minnehaha Co.: H. N. Moldenke 7676 (N). Pennington Co.: O. M. Clark 6044 (B); H. N. Moldenke 7704 (N); Over 1507 (Bl—42344); Visher 1129 (Se—14952), 1507 (N). Spink Co.: J. F. Brenckle 47-533 (N); Petrak s.n. [31.VII.1950] (S, S); A. E. Ricksecker 48 (Ca—475441, Ob—50841, Po—215279, Um—211, Ur). Stanley Co.: Over 6168 (Bl—42337). Turner Co.: V. L. Harms 411 (Lw). Washabaugh Co.: Kienholz 47 (Ur). Yankton Co.: L. H. Pammel s.n. [Yankton, Aug. 6, 1919] (Io—96322). KANSAS: Allen Co.: A. S. Hitchcock s.n. [Allen Co., July 1896] (Ka). Anderson Co.: A. S. Hitchcock s.n. [Anderson Co., July 1896] (Ka); W. H. Horr s.n. [July 22, 1929] (Lw); A. R. Moldenke 880 (Lw). Atchison Co.: A. S. Hitchcock s.n. [Atchison Co., Oct. 1896] (Ka); Horr & McGregor s.n. [6/26/46] (Lw); Jeanette 72 (I); A. R. Moldenke 908 (Lw); Nolte 10 (I). Barber Co.: A. S. Hitchcock s.n. [Medicine L., July 1892] (Ka); Kellerman s.n. [Medicine Lodge, July 14, 1888 (Ka); R. L. McGregor 14068 (Lw), 14435 (Lw), 14463 (Lw), 14849 (Lw); J. D. Poindexter 201-46 (Lw); A. R. Moldenke 895 (Lw); B. L. Wagenknecht 4369 (Lw). Bourbon Co.: Kellerman s.n. [Ft. Scott, July 15, 1887] (Ka); Z. D. Thompson 587 (Lw). Brown Co.: Clothier & Whitford s.n. [July 29, 1897] (Ka); Garner s.n. [Aug. 1925] (Ka—72013); W. H. Horr 4482 (Lw); R. L. McGregor 17058 (Lw); A. R. Moldenke 915 (Lw). Butler Co.: J. Davis s.n. [Douglass, July 22, 1887] (Ka); W. H. Horr s.n. [8/6/29] (Lw); J. D. Johnson s.n. [July 1926] (Ka—71719). Chase Co.: Kellerman s.n. [Strong City, July 27, 1887] (Ka); B. L. Wagen-

knecht 4324 (Lw). Chautauqua Co.: W. H. Horr s.n. [July 5, 1930] (Lw); A. R. Moldenke 887 (Lw); B. L. Wagenknecht 1831 (Lw), 1853 (Lw). Cherokee Co.: N. B. Jacobs 46 (N); Kellerman s.n. [Columbus, July 13, 1887] (Ka); E. W. Lathrop 2619 (Lw); R. L. McGregor 1708 (Lw); J. D. Poindexter 207-27 (Lw). Cheyenne Co.: Bofman 22 (Ky), 311 (Ka--92665); V. L. Harms 1219 (Lw); A. S. Hitchcock s.n. [Cheyenne Co., June 28, 1897] (Ka); W. H. Horr 4689 (Lw); R. L. McGregor 9441 (Lw); Roach 411 (Au--122717). Clark Co.: A. S. Hitchcock s.n. [Clark Co., Aug. 1896] (Ka). Clay Co.: Kellerman s.n. [Clay Centre, July 2, 1888] (Ka); R. L. McGregor 5012 (Lw). Cloud Co.: Carleton s.n. [July 9, 1888] (Ka, Ur); S. V. Fraser 440 (Ka--78937). Coffey Co.: W. H. Horr 3475 (Lw, W--2030701); Wimpey s.n. [Burlington, July 1896] (Ka). Comanche Co.: A. S. Hitchcock s.n. [Comanche Co., Aug. 1898] (Ka); R. L. McGregor 11677 (Lw). Cowley Co.: Clothier & Whitford s.n. [Aug. 22, 1897] (Ka); R. L. McGregor 10397 (Lw); H. N. Moldenke 21926 (Lw). Crawford Co.: Clothier & Whitford s.n. [Aug. 12, 1897] (Ka). Decatur Co.: Kellerman s.n. [Oberlin, July 11, 1888] (Ka); R. L. McGregor 9478 (Lw), 13530 (Lw); E. L. Richards 1048 (Lw), 2860 (Lw). Dickinson Co.: A. S. Hitchcock s.n. [Dickinson Co., June 1896] (Ka); W. H. Horr s.n. [July 19, 1930] (Lw); H. N. Moldenke 21931 (Lw, Ut); J. B. S. Norton s.n. [September 1895] (Ka). Doniphan Co.: Clothier & Whitford s.n. [July 31, 1897] (Ka). Douglas Co.: Chamney 1 (Lw); Garrett 8466 (Se--14953); Kellerman s.n. [Lawrence, July 20, 1887] (Ka); R. L. McGregor 115 (Lw, S); J. D. Poindexter 37 (Lw), 229-6 (Lw), 229-20 (Lw); Snow s.n. [July] (Fl--21122); W. C. Stevens 6728 (Lw), s.n. [Lawrence] (W--216103). Edwards Co.: A. S. Hitchcock s.n. [Edwards Co., Sept. 1, 1897] (Ka); R. L. McGregor 10538 (Lw). Elk Co.: Clothier & Whitford s.n. [Aug. 20 & 21, 1897] (Ka); A. R. Moldenke 877 (Lw). Ellis Co.: A. S. Hitchcock s.n. [Ellis Co., August 1895] (Ka); Imler s.n. [June 20, 1928] (Lw); E. Runyon 175 (Bl--42348, Bt--14919, Cm, Go, Lb--33196, Ok, S, St--9263, Vt). Ellsworth Co.: A. S. Hitchcock s.n. [Ellsworth Co., July 1895] (Ka); R. L. McGregor 9260 (Lw), 12388 (Lw); A. R. Moldenke 899 (Lw); B. L. Wagenknecht 1907 (Lw), 1971 (Lw), 3232 (Lw). Finney Co.: Wilson & Miller 6728 (Lw), s.n. [7-22-12] (Lw). Ford Co.: Kellerman s.n. [Bucklin, June 26, 1888] (Ka). Franklin Co.: Hetzger 374 (Lw); A. S. Hitchcock s.n. [Franklin Co., July 1896] (Ka). Geary Co.: F. C. Gates 17504 (Ka--80314), 19957 (Au), 20509 (N); Gayle 510 (C); Hulbert 3298 (Lw); H. N. Moldenke 21932 (Lw); S. F. Norton s.n. [June 27, '94] (Ka). Gove Co.: A. S. Hitchcock s.n. [Gove Co., July 1895] (Ka); G. J. Inkenberry 59 (St--18206), s.n. [Sept. 10, 1918] (Ca--943061). Graham Co.: A.

S. Hitchcock s.n. [Graham Co., June 20, 1897] (Ka). Greeley Co.: M. Reed s.n. [Tribune, Aug. 5, 1892] (Ka), s.n. [Tribune, Sept. 11, 1892] (Ca--104870); Rose & Fitch 17074 (N, W--639221). Greenwood Co.: A. S. Hitchcock s.n. [Eureka, July '92] (Ka); W. H. Horr s.n. [July 28, 1930] (Lw); Ripley & Barneby 7251 (N). Hamilton Co.: C. H. Thompson 154 (Ca--181849, Ka, N, W--265840). Harper Co.: Kellerman s.n. [Harper, July 14, 1888] (Ka); A. R. Moldenke 889 (Lw). Harvey Co.: V. L. Harms 669 (Lw); Herrick s.n. [Aug. 1898] (Ka); Muck 82 (Ka--92760). Hodgeman Co.: A. S. Hitchcock s.n. [Hodgeman Co., August 1895] (Ka); R. L. McGregor 10595 (Lw). Jackson Co.: Norton & Clothier s.n. [July 5th, 1895] (Ka); M. Reed s.n. [Avoca, July 25, 1891] (Ca--25170); E. L. Richards 919 (Lw). Jefferson Co.: G. Latham 259 (Lw), 350 (Lw); D. L. Marsh 1613 (Hi-162048, Lw). Jewell Co.: R. L. McGregor 7377 (Lw). Johnson Co.: Kellerman s.n. [Olathe, July 7, 1887] (Ka). Kingman Co.: Branaman s.n. [July 29th 1895] (Ka); R. L. McGregor 10724 (Lw). Kiowa Co.: A. S. Hitchcock s.n. [Kiowa Co., Aug. 1896] (Ka). Labette Co.: A. S. Hitchcock s.n. [Labette Co., Aug. 1896] (Ka); B. L. Wagenknecht 1890 (Lw). Lane Co.: A. S. Hitchcock s.n. [Lane Co., August 1895] (Ka). Leavenworth Co.: Clothier & Whitford s.n. [Aug. 3, 1897] (Ka); Herb. Western Fem. Sem. s.n. [Stranger] (Pu); Sloan 4 (Ka--93196). Lincoln Co.: A. S. Hitchcock s.n. [Lincoln Co., July 1895] (Ka); R. L. McGregor 7446 (Lw). Linn Co.: Brooks & Brooks s.n. [1928] (Cm, Cm); Kellerman 1 (Ka); A. R. Moldenke 871 (Lw), 881 (Lw). Logan Co.: A. S. Hitchcock s.n. [Logan Co., July 1895] (Ka); R. L. McGregor 9408 (Lw), 17236 (Lw). Lyon Co.: H. A. Elmore s.n. [Emporia, July 1, 1922] (Je); R. L. McGregor 1885 (Lw); B. L. Wagenknecht 4180 (Lw). Marion Co.: Griffiths 5050 (W--496552); A. S. Hitchcock s.n. [Marion Co., August 1895] (Ka); R. L. McGregor 10764 (Lw). Marshall Co.: A. S. Hitchcock s.n. [Marshall Co., Dec. 10, 1896] (Ka); W. H. Horr 4548 (Lw). McPherson Co.: G. R. Babcock s.n. [Roxbury, June 23, 1887] (Ka). Meade Co.: W. H. Horr 3235 (Lw), 3275 (Lw), 3278 (Lw), 3450 (Lw, W--2030692), 3235 (N); Kellerman s.n. [Meade Centre, June 26, 1888] (Ka); J. D. Poindexter 166-17 (Lw). Miami Co.: A. S. Hitchcock s.n. [Paola, Aug. 1892] (Ka). Mitchell Co.: H. V. Dwyer s.n. [July 1896] (Ka). Montgomery Co.: A. S. Hitchcock s.n. [Montgomery Co., August 1896] (Ka); W. H. Horr s.n. [July 5, 1930] (Lw); A. R. Moldenke 882 (Lw); Rydberg & Imler 433 (N). Morris Co.: W. H. Horr s.n. [July 17, 1930] (Lw); R. L. McGregor 14134 (Lw); Trembly s.n. [Summer 1894] (Ka). Morton Co.: E. L. Richards 2959 (Lw), 3533 (Lw). Nemaha Co.: A. S. Hitchcock s.n. [Nemaha Co., Dec. 11, 1896] (Ka); Pettit 23 (Ka). Neosha Co.: W. W. Holland 130 (Lw); W. H. Horr 6728 (Lw).

Norton Co.: F. C. Gates 16900 (Ka--76273); W. H. Horr 5022 (Lw); Kellerman s.n. [Norton, July 11, 1888] (Ka); E. L. Richards 2781 (Lw). Osage Co.: W. H. Horr E.33 (B, Ca--45170, Lw, No--12402, Ok, S, Tl, Ur, Vi, W--2031022, We); Kellerman s.n. [Burlingame, July 21, 1887] (Ka); B. L. Wagenknecht 4040 (Lw). Osborne Co.: Dawley s.n. [1893] (Ka); Loomis s.n. [Alton, Oct. 1938] (Ka--90127); R. L. McGregor 7418 (Lw), 9626 (Lw); Neher 115 (Ka--80028); Shear s.n. [Summer 1894] (Ua--24447). Ottawa Co.: A. S. Hitchcock s.n. [Ottawa Co., July 1895] (Ka); H. N. Moldenke 21929 (F). Pawnee Co.: A. S. Hitchcock s.n. [Pawnee Co., August 1895] (Ka). Philipps Co.: A. S. Hitchcock s.n. [Philipps Co., June 29, 1897] (Ka); W. H. Horr 4767 (Lw); R. L. McGregor 9542 (Lw); E. L. Richards 2732 (Lw). Pottawatomie Co.: F. C. Gates 12613 (Ka--72797, Lb--27620); Kellerman s.n. [St. George, June 23, 1888] (Ka); L. D. Marsh 1735 (Hi--162532, Lw, W--2327297); B. L. Wagenknecht 3256a (Lw). Pratt Co.: A. S. Hitchcock s.n. [Pratt Co., Aug. 1896] (Ka); Hulbert 3189 (Lb--50539, Lw). Rawlins Co.: V. L. Harms 1244 (Lw); A. S. Hitchcock s.n. [Rawlins Co., June 1897] (Ka); R. L. McGregor 9460 (Lw). Reno Co.: A. S. Hitchcock s.n. [Tudor, July 1892] (Ka); R. L. McGregor 12510 (Lw). Republic Co.: G. E. Morley 232 (Lw); D. K. Thomas s.n. [Scandia, 1890] (Ka). Rice Co.: A. S. Hitchcock s.n. [Rice Co., August 1895] (Ka); B. L. Wagenknecht 4543 (Lw). Riley Co.: I. M. Atkins s.n. [Oct. 1, 1935] (St--21411); F. C. Gates 12660 (Mi); V. C. Hubbard s.n. [Sept. 1927] (Lb--27619); Maus s.n. [Rocky Ford, June 18, 1927] (Mi); J. B. S. Norton 391 (Ka, N, W--353118); Payne s.n. [Manhattan, August 1886] (Ur); M. Reed s.n. [Manhattan, 6-30-1892] (Ka); W. T. Swingle s.n. [Manhattan, June 20, 1888] (Ka). Rooks Co.: R. L. McGregor 9590 (Lw); Wilkin s.n. [June 15, 1887] (Ka). Rush Co.: A. S. Hitchcock s.n. [Rush Co., August 1895] (Ka). Russell Co.: A. S. Hitchcock s.n. [Russell Co., July 1895] (Ka); W. H. Horr 4937 (Lw); R. L. McGregor 5683 (Lw), 9283 (Lw). Saline Co.: Hancin 394 (Ka--76791); A. S. Hitchcock s.n. [Saline Co., June 1896] (Ka); H. N. Moldenke 21930 (Lw). Scott Co.: R. L. McGregor 9367 (Lw). Sedgwick Co.: T. L. Andrews s.n. [Whichita] (Io--28275, Io--28276); Herb. Wichita Univ. 12 (Lw); W. H. Horr s.n. [8/8/29] (Lw); A. S. Miller s.n. [Wichita, Mar. 1892] (Ka). Shawnee Co.: W. A. Dick s.n. [6-12-87] (Ob--50837); Maus 847 (Ka--72355, Um--206); Volle 202 (Lw), 232 (Lw). Sheridan Co.: A. S. Hitchcock s.n. [Sheridan Co., June 21, 1897] (Ka). Sherman Co.: F. C. Gates 16774 (Ka--76399); V. L. Harms 1207 (Lw, N); A. S. Hitchcock s.n. [Goodland, Jan. 1892] (Ka). Smith Co.: V. L. Harms 1312 (Lw); Kellerman s.n. [Smith Centre, July 10, 1888] (Ka); E. L. Richards 2891

(Lw). Stafford Co.: R. L. McGregor 13711 (Lw); A. R. Moldenke 897 (Lw); Ungar 788 (Lw). Sumner Co.: Kellerman s.n. [Argonia, July 26, 1887] (Ka). Thomas Co.: A. S. Hitchcock s.n. [Thomas Co., June 23, 1897] (Ka). Trego Co.: D. A. Horr 4173 (Lw); R. L. McGregor 9331 (Lw); M. Reed s.n. [July 8, 1892] (Ka). Wabaunsee Co.: Clothier s.n. [June 22, 1896] (Ka); Maus 30 (Ka--72469, Ob--50832). Wallace Co.: R. L. McGregor 17286 (Lw). Washington Co.: Clothier & Whitford s.n. [July 24, 1897] (Ka); W. H. Horr 4662 (Lw). Wichita Co.: M. Reed s.n. [Selkirk, Aug. 13, 1892] (Ka). Wilson Co.: Haller s.n. [Roper, June 26, 1896] (Ka); W. H. Horr s.n. [July 12, 1930] (Lw); A. R. Moldenke 878 (Lw). Woodson Co.: Clothier & Whitford s.n. [Aug. 29, 1897] (Ka); W. H. Horr s.n. [July 10, 1930] (Lw), s.n. [7/11/30] (Lw); E. W. Lathrop 558 (Lw, W--2235099), 698 (N), 963 (Lw); A. R. Moldenke 879 (Lw). Wyandotte Co.: M. Reed s.n. [Argentine, June 26, 1890] (Ka); E. L. Richards 3220 (Lw). County undetermined: Kleeberger s.n. [1876] (Gg--31417); S. Norton s.n. [Aug. 11, 1902] (Mi); C. A. Ripley s.n. [E. Kansas, July 20, 1890] (Ob--50797), s.n. [E. Kansas, June 19, 1895] (Ob--50833). MISSOURI: Adair Co.: C. S. Sheldon s.n. [Sept. 1, 1883] (Al). Barry Co.: B. F. Bush 210 (W--318221). Barton Co.: E. J. Palmer 54418 (Lb--50952). Bates Co.: H. N. Moldenke 21923 (Lw). Benton Co.: H. N. Moldenke 21920 (Lw). Boone Co.: Daniels s.n. [Columbia, Jun.-Oct. 1897] (Lb--9608), s.n. [Columbia, July 3, 1903] (Lb--4182, Lb--4190), s.n. [Columbia, July 1903] (Lb--4187); Favor s.n. [Columbia, Sept. 3, '01] (Lb--4189), s.n. [Columbia, June 22, 1902] (Lb--4188); Henson s.n. [June 30, 1940] (N); Rickett s.n. [Sept. 1926] (H--106466), s.n. [Rocheport, June 19, 1927] (Lb--7096); O. E. Thomas s.n. [Columbia] (Je--5345). Callaway Co.: Schwab s.n. [McCredie, July 1924] (Up). Camden Co.: A. R. Moldenke 858 (Lw). Chariton Co.: Mrs. H. S. Young s.n. [June 23, 1925] (Cm). Clay Co.: B. F. Bush 12696b (Bt--15496); C. J. Elmore s.n. [Liberty, Aug. 25, 1923] (Je--3160); Gier 8132 (S); K. K. Mackenzie 261 (S). Clinton Co.: C. R. Barnes s.n. [Converse, 8-4-77] (Pu). Crawford Co.: A. R. Moldenke 848 (Lw). Franklin Co.: D. L. Marsh 1663 (Lw); J. M. Mason s.n. [Meramec State Park, 7/15/35] (Lb--34371); A. R. Moldenke 847 (Lw). Greene Co.: Blankinship s.n. [Willard, July 9, 1919] (Po--63848); J. I. Cantrell s.n. [Springfield, June 17, 1929] (Lb--14483); P. C. Standley 8325 (W--687286). Grundy Co.: Crookshanks 135 (Lb--29649). Henry Co.: H. N. Moldenke 21921 (Lw). Hickory Co.: A. R. Moldenke 861 (Lw). Iron Co.: L. H. Pammel s.n. [Pilot Knob, June 17, '88] (Io--15351). Jackson Co.: B. F. Bush 426 (C), 475 (C), s.n. [7-2-1892] (Lb--4183); Erisman s.n. [Kansas City, June 26, '94] (Ah); K. K. Mackenzie s.n. [July 17, 1900] (N). Jasper

Co.: Demaree 39337 (Bm). Lincoln Co.: A. R. Moldenke 842 (Lw). Maries Co.: H. N. Moldenke 21917 (Lw). Marion Co.: J. Davis 2791 (Um--210), 3227 (Se--14951), 4461 (Du--202359), 6246 (Um--209), FDM (Ur), s.n. [near Hannibal, 9-6-13] (In), s.n. [Hannibal, 17-7-13] (Au, Au), s.n. [Hannibal, 24-6-14] (Mi), s.n. [Hannibal, 14-7-14] (Au), s.n. [Hannibal, 20-7-15] (Gg--216419). Miller Co.: A. R. Moldenke 856 (Lw). Nodaway Co.: J. R. Singleton 106 (Lb--34596). Ozark Co.: Leopold s.n. [10.9.39] (Lb--48919); Rickett s.n. [Rock Bridge, June 26, 1927] (Lb--7094). Pemiscot Co.: A. J. Davis s.n. [Hamlin, July 7, 1917] (Se--15988). Phelps Co.: Drouet s.n. [July 12, 1931] (Lb--9247); A. R. Moldenke 849 (Lw). Pike Co.: Fritchey 559 (Lb--4184). Platte Co.: Radloff s.n. [July 24, 1956] (Ur), s.n. [July 25, 1956] (Ur). Ralls Co.: J. Davis 40 (Ur), 3779 (Ur). Reynolds Co.: R. L. McGregor 17195 (Lw). Saint Louis Co.: Collector undesignated s.n. [Between St. Louis & Iron Mts., Aug. 24, 1878] (W--221165); M. Craig s.n. [West Richmond, Aug. 1912] (Ca--181682); Eggert s.n. [Herb. Geete 5709] (Go); Glatfelter s.n. [near St. Louis, 7-20-92] (Mi); Letterman 14 (Po), s.n. [Allenton, June 28, 1911] (Io--76363), s.n. [Allenton, July 6, 1911] (Or--14360); H. N. Moldenke 21798 (Mi); L. H. Pammel s.n. [Jefferson Barracks, 6-1888] (Io--22914); L. F. Ward s.n. [Aug. 22, 1878] (W--147587). Stone Co.: B. F. Bush s. n. [Oct. 9, 1936] (Md); Z. Williams s.n. [Hurley, August 1927] (Lb--4191). Taney Co.: D. L. Spencer s.n. [7-25-40] (Lb--35420, Lb--48920). Warren Co.: A. R. Moldenke 844 (Lw). Wayne Co.: E. J. Palmer 6107 (Po--217514, W--1581049). Wright Co.: Lansing 3164 (Ur). Saint Louis: Drummond s.n. [1832] (C); Eggert s.n. [12 July 1877] (S); Engelmann 339 (Pr), s.n. [St. Louis, July 1839] (S), s. n. [St. Louis, Aug. 1841] (W--71934); Fendler s.n. [Herb. Krause 16832] (B); F. D. Kelsey s.n. [Sept. 1894] (Ob--50838); M. Martens s.n. (Br, Br); B. H. Patterson s.n. [St. Louis, Oct. 1, 1904] (Cm); Riehl 196 (Br, M). County undetermined: Z. Baldwin s.n. (Au); Buckley s.n. (T); Engelmann s.n. [July 1839] (Br, Br); Geyer s.n. [Upper Missouri, July] (C); Pringle s.n. [Southeastern Missouri, 30 July 1885] (Vt); Spillman 298 (Pl--22615). ARKANSAS: Baxter Co.: Demaree 20675 (N, Sm), 23606 (Sm), 29314 (N). Benton Co.: Heacox s.n. [July 20, '89] (Ob--50834). Boone Co.: Demaree 30203 (Au--122703, Au--122725, N, Ok, St). Clay Co.: Demaree 27030 (N). Conway Co.: Demaree 37218 (Sm). Craighead Co.: Demaree 5085 (Ok), 27113 (Au--122704, N, Ok, St). 30772 (N). Faulkner Co.: F. A. Haas 1673 (W--1654392). Franklin Co.: Ruth 31 (W--1522032). Garland Co.: Scully 334 (Ky). Green Co.: Demaree 26698 (Au--122712, N, Ok, St). Hot Spring Co.: Demaree 17889 (N), 17962 (N); R. E. Earle s. n. [Malverne, July 19, 1877] (N). Independence Co.: Demaree 23800

(Sm), 26792 (N). Izard Co.: Demaree 22745 (Sm), 23376 (Sm), 23378 (Sm). Johnson Co.: Demaree 19995 (N, Sm). Lawrence Co.: Demaree 25748 (N), 26152 (Au--122738, N). Logan Co.: Demaree 17723 (N, Ok), 25194 (Bm); Pyle 928 (De); Welch 1121 (Dp); Mrs. H. S. Young s.n. [June 16, 1925] (Cm). Marion Co.: Demaree 29151, in part (Au--122707, N, St), 30032 (N), 30909 (Au--122706, Le), 47937 (Lw). Mississippi Co.: McAtee 2053 (N, W--587275). Phillips Co.: Demaree 15224 (Du--256558, Gg--267615, H--97679, Ok), 15244 (Ky, N, Pl--131530, Ur, Ur), 19251 (N, Sm). Poinsette Co.: Demaree 17568 (N, Ok). Pope Co.: Demaree 19871 (Mm, N, Sm). Pulaski Co.: Coville 3 (W--210602); Demaree 8365 (Bt--11509, W--1582394); F. W. Pennell 10654 (N). Randolph Co.: Demaree 29179 (N), 30963, in part (Au--122705, Le, Ok); R. D. Hamilton s.n. [Current River, 8/2/38] (Cm). Searcy Co.: Demaree 22251 (Hi--170690, Lb--53414, N, Sm). Sebastian Co.: Bigelow s.n. [Fort Smith, 1853--4] (W--71933); Rolfs s.n. [Ft. Smith, Aug. 1891] (Io--32271). Sharp Co.: Demaree 26270 (Au--122737, N). Stone Co.: Demaree 23495 (Sm), 27831 (N). Van Buren Co.: Demaree 22274 (N, Sm). Washington Co.: Braly s.n. [Fayetteville, July 19, 1893] (St); Demaree 22435 (N, Sm), 22453 (Lb--53415); F. L. Harvey 61 (Cm, Cm, Mi, Ur), 261 (Pa), s.n. [Fayetteville, May] (Ur); Nix s.n. [June 7, 1893] (Ok). County undetermined: F. L. Harvey s.n. [Curtiss 1958] (Bc, C, Cm, Pa, Vt). MONTANA: Big Horn Co.: Blankinship s.n. [Crow Agency, July 14, 1901] (Fc). Missoula Co.: Kirkwood 1822 (Ca--352291, Mn--17746, N). IDAHO: Kootenai Co.: J. H. Christ 11832 (N); C. Epling s.n. [Post Falls, July 1929] (La); Milburge 969 (Se--15930). WYOMING: Albany Co.: C. L. Porter 7151 (Au--122709, Ca--39483, Gg--407318, Mg, N). Laramie Co.: Cantrell s.n. [8/15/47] (Ok); F. V. Hayden s.n. [Camp Carlin, July 1870] (Pa); A. Nelson 538 (Ur). Platte Co.: A. Nelson 505 (C, Cm, Ur, W--284504). Weston Co.: Degener & Peiler 16180 (N, N, N). County undetermined: F. V. Hayden s.n. [Aug. 1 — Sept. 13, 1870] (W--235940). UTAH: Utah Co.: A. O. Garrett 3172 (S). COLORADO: Baca Co.: Weber & Anderson 5204 (Ca--945429, No--23718). Boulder Co.: W. A. Weber 5270 (No--23646). Cheyenne Co.: Heustis s.n. [Cheyenne Wells, July 25, 1906] (Bl--42311). Denver Co.: Eastwood 90 (Bl--42334, Ca--148062, Gg--31424, St--22948, W--582335). Elbert Co.: Demaree 29416 (Le). El Paso Co.: Bacigalupi 931 (Du--195879); Biltmore Herb. 4758a (S); Ferril s.n. [Sept. 1, 1902] (Bl--42313). Jefferson Co.: Bethel s.n. [Wheatridge, Aug. 16, 1916] (Gg--31422); Heustis s.n. [Wheatridge, 8-16-16] (Bl--42335). Kit Carson Co.: Ownbey 1363 (Ca--590153, Ca--882815, Id, Mn--31207, N, Pl--83803, Se--31567, Ua--34285). Las Animas Co.: C. M. Rogers 6076 (Au--122716), 6111 (W--2053608), 6956 (W--2000602). Logan Co.: Osterhout s.n. [Sterling, July 6,

1932] (Po--191051). Prowers Co.: Collector undesignated s.n. [Arkansas valley in eastern Colo.] (Fc). Washington Co.: Piemeisel 1576 (W--584372). Yuma Co.: Eggleston 15224 (Dt), 15528 (W--1112861); Ewan 12917 (En); Harrington & Smith 417 (Fc); Piemeisel 1533 (W--584326); Ramaley 12768 (Bl--42362). County undetermined: J. L. Sheldon s.n. [Engelmann's Canon, Aug. 5, 1903] (We). NEBRASKA: Adams Co.: J. H. Barnhart 468 (N). Buffalo Co.: "W. E. B." s.n. [Aug. 1922] (Ok--10361); J. H. Holmes s.n. [Kearney, Aug. 1889] (Fc--2505, W--71938). Antelope Co.: Rohrbaugh 41 (Au--122724). Cass Co.: M. E. Day 221 (Ob--99771); H. N. Moldenke 21936 (Lw); J. L. Morrison 1218 (Go). Cedar Co.: F. E. Clements 2663 (Ca--124661, W--71944). Cherry Co.: Tolstead 415 (Bt--35085). Cheyenne Co.: Osterhout s.n. [north of Sidney, July 7, 1932] (Po--216659). Custer Co.: C. L. Dietz s.n. [24 July 1927] (Se--21475); H. J. Webber s.n. [Anselmo, July 8, 1889] (W--216329). Douglas Co.: Eastman s.n. [Omaha, Aug. 16, 1915] (Ur); Kleeberger s.n. [Omaha] (Gg--31420). Greeley Co.: Nolte 99 (I). Harlan Co.: L. H. Pammel s.n. [Alma, June 21, 1897] (Cm). Hooker Co.: Rydberg 1422, in part [near the forks of the Dismal River, Hooker County, on prairie, July 11, 1893] (C). Kearney Co.: H. Hapeman s.n. [Minden, July 1, 1833] (Gg--237860), s.n. [June 23, '91] (Hp), s.n. [July 14, 1930] (En--2509), s.n. [Minden, 1930] (Po--213214), s.n. [Minden, June 29, 1932] (Bt--12318, Ua--11390), s.n. [Minden, June 26, 1933] (Ca--512294, Ew, Ew), s.n. [July 1, 1933] (I, Id), s.n. [Minden, July 6, 1937] (Sd--23838). Keith Co.: C. O. Erlanson 2260 (Mi); M. E. Jones s.n. [Ogalalla, June 16, 1925] (Po--118078). Knox Co.: Krautter s.n. [Niobrara Reserve, July 1903] (Up). Lancaster Co.: Herb. Okla. Coll. Women 311 (Ok); Herb. Univ. Nebr. 259 (Au); Pipal s.n. [Lincoln, 6-9-11] (Ah); Seal s.n. [Lincoln, June 30, 1897] (W--2311053); J. L. Sheldon s.n. [Lincoln, September 1897] (We); Whited 2686 (Or--12379). Lincoln Co.: F. G. Miller s.n. [7-17-01] (Io--22904, Io--22915); Plank s.n. [North Platte, July 1896] (N). Merrick Co.: A. A. Heller 11290 (Du--156905, Se--88043). Nance Co.: L. B. Curtis s.n. [Genoa, June 22, 1903] (Ok--10363). Nemaha Co.: H. N. Moldenke 21934 (Lw); J. L. Sheldon s.n. [Peru, July 21, 1900] (We), s.n. [Peru, August 1900] (We); Shubert s.n. [Peru, July 1933] (Ob--50798); Vance s.n. [Peru] (Bt--18923); J. M. Winter 20 (W--1679069). Otoe Co.: A. E. Allan s.n. [Talmage, July 11, 1891] (Je); H. N. Moldenke 21935 (Lw); Wibbe s.n. [Salina, Sept. 1881] (Du--91129). Phelps Co.: McMillan s.n. [Holdrege] (Io--53117). Pierce Co.: V. L. Harms 581 (Lw). Platte Co.: Clevenger s.n. [Columbus, June 21, 1904] (La). Richardson Co.: Grinstead 85 (Ky); H. N. Moldenke 21933 (Lw). Scotts Bluff Co.: F. G. Miller s.n. [Aug. 19, 1901] (Io--22916). Sheridan Co.: R. E. Buchanan s.n. [Spade

Ranch, August 2--20, 1905] (Io--46519); J. B. Hatcher s.n. [on the Running Water, July 1--10, 1886] (Ca--25173), s.n. [July 1886] (Pr). Thomas Co.: Krautter s.n. [Halsey, July 23, 1907] (Up--45720, Up--45742, Up--45743, Up--45744, Up--45747); Rydberg 1422 (C, W--210363). Washington Co.: Conard S.279 (Se--19993); Lallman s.n. [July 5, 1931] (Bt--32238). County undetermined: E. K. Abbott s.n. (Gg--31425); F. E. Clements s.n. [Nebraska, 1893] (W--71942); F. V. Hayden s.n. [Bad Lands, 1856] (Dt); LeRoy s.n. [Nebraska] (C); R. de Lima 101 [Oregon Trail] (I); McClatchie s.n. [Endell, July 1889] (N); B. H. Patterson s.n. [July 6, 1895] (Cm). OKLAHOMA: Adair Co.: C. S. Wallis 2387 (St). Atoka Co.: V. L. Cory 56792 (St). Beaver Co.: Hindman 234 (St), 254 (St). Beckham Co.: B. Osborn 1368r (Ok). Bryan Co.: W. S. Blain s.n. [Durant, June 23, 1935] (Bt--29681). Caddo Co.: C. T. Eskew 1089 (Ok); Edw. Palmer 243 (C, Du--177391), 244 (T, W); Van Vleet 34 (Ok--10331, Ok--10329). Canadian Co.: D. B. Dunn 13325 (Lb--43627); A. R. Moldenke 114 (Fg). Carter Co.: Collector undesignated 1614 (W--1466833); Kinnan 91 (Ok). Cherokee Co.: R. Bebb 4376 (Ok); Bradfield & Blythe s.n. [7/10/24] (St--9267); Prier s.n. [July 1, 1924] (St--9268); C. S. Wallis 4037 (St). Choctaw Co.: H. W. Houghton s.n. [Stevens 4000] (N). Cleveland Co.: Babb 108 (Ok--10319); Bayliff s.n. [July 11] (Ok--10326); Bruner 11376 (H--5479), s.n. [Norman, 6/15/24] (Io--117042, Ok--10332, Or--18976); Collector undesignated s.n. [Lexington, 7-3-19] (Wi); Demaree 13077 (Ok--20377); Fielder 100 (Ok--10320); Flowers 67 (Ok); George 29 (Ok); Gowan 46 (Ok--10327); Jeffs s.n. [5/30/1921] (Ok--17535); L. Martin s.n. [6-26-28] (Ok--10337); W. S. Myers 55 (Ok), s.n. [June 22, 1926] (Ok); Personett 52 (Ok--10334); Stemen 136 (Ok); C. Whaley 22 (Ok--10321). Comanche Co.: M. K. Clemens 11748 (Ba), 11748a (Ba); Demaree 12996 (Ca--717793, N, Ok--22239); Kaeiser 33 (Ok); G. W. Stevens 1354 (Ur), 1354 1/2 (Ok). Craig Co.: Waterfall 8193 (Ok). Custer Co.: Jeffs s.n. [June 18, 1930] (Ok--10338); Mericle 1629 (Ok). Delaware Co.: Goodner 42 (Ca--882817). Ellis Co.: G. W. Stevens 2930 (Ok). Garfield Co.: Gephardt 769 (Ok). Garvin Co.: C. Kennedy 317 (Ok). Grady Co.: Albers 46 (Ok); Spears 91 (St--9264); Wall 3 (Ok). Greer Co.: G. W. Stevens 1034 (Du--65525, Ok, St--9266, Ur). Harper Co.: Stratton 403 (St--26129). Kay Co.: W. W. Barkley s.n. [July 1929] (Ok--13759); Davy s.n. [July 11, 1939] (St--17554); G. W. Stevens 1865 (Ok, St--9262); J. J. Taylor 18 (St). Kingfisher Co.: Mrs. E. E. Bogue 1387 (No--8617); Byers 7 (St--17552). Latimer Co.: O. M. Clark 2804 (Ok--10318). Leflore Co.: Blakley s.n. [G. W. Stevens 1457] (Du--66340, Ok, St--9265, Ur, W--589571); "R. E. J." s.n. [Winding Stair Mts., 6/30/19] (Ok--

10335). Lincoln Co.: O. M. Clark 2245 (B). Logan Co.: C. C. Smith G.689 (Ok—16362). Marshall Co.: G. J. Goodman 6475 (Bs, Ok, Z); Kelting 181 (Ok); P. B. Riggs 1981 (S); Starks s.n. [8 July 1950] (Ok). Mayes Co.: Flowers 427 (Ok); C. S. Wallis 3348 (St), 7674 (Au—1711439, St). McClain Co.: Harding 553 (St—20329); M. Hopkins 13364 (Ba, Ok—20523, St—12770); C. C. Smith 550 (Ok), 809 (Ok); Stratton 4770 (St—26143), 4771 (Ml, N, St—26144, St—26145). McCurtain Co.: Puckette 38 (Au—122714). Murray Co.: Emig 42 (Cm), 787 (Cm); C. T. Eskew 1019 (Ok); M. Hopkins 1168 (Ok), 5207 (Ok), 5410 (Ok, Ok), 6023 (Ok); Hopkins & Cross 6450 (Ok); Hopkins, Nelson, & Nelson 659 (Ok); McLennan 122 (St—24885); Merrill & Hagen 599 (Ok—19976); G. Mitchell 505 (Ok); Rutledge & Gage 581 (Ok—10333); Stratton 4730 (N, St—26139, St—26140). Muskogee Co.: R. Bebb 5017 (Ok, Ok); E. L. Little 181 (Ok—10336), 1583 (Ok—10325), 1935 (Ok—10324); W. Purcell 63 (Ok); C. S. Wallis 4584 (St); Waterfall 10269 (St). Oklahoma Co.: A. R. Moldenke 113 (Fg); Waterfall 1483 (Ok, St). Okmulgee Co.: Autry 81 (St). Osage Co.: Harding 59 (St—17563); Sizemore 272 (St). Ottawa Co.: E. B. Miller 62 (St—24972); G. W. Stevens 2308, in part (Du—66376), A.2312 (St—9261). Pawnee Co.: Stratton 249 (St—26125). Payne Co.: S. E. Myers s.n. [Stillwater, Aug. 20, 1897] (Ca—882821); Waterfall 114 (St). Pittsburg Co.: Mauldin s.n. [near McAlester, July 19, 1942] (Rf); McClary 58 (Ok—16286). Pontotoc Co.: Duffer 123 (St); D. McCoy 720 (St), 906 (St), 1717 (St); G. T. Robbins 2742 (Ca—966176, N, Ok), 3176 (Ca—904344, Ok); Stratton 6169 (Hi—152269, Ml, N, St—26161). Pottawatomie Co.: E. D. Barkley 249 (Ok—16731), 1485 (Mn—28630); F. A. Barkley 1485 (Ca—882814); Demmer 19 (Ok); Hopkins & Demaree 8 (Ok); Jacobs 19 (Ok). Rogers Co.: Waterfall 1454 (N, St). Sequoyah Co.: C. S. Wallis 4489 (St). Tulsa Co.: M. B. Clark 366 (St); Force s.n. [6/25/28] (Ok—10323); Gatti 689 (St—9259); Markley 71 (Se—69272); Prewett 5 (Au); Stoneman s.n. [Sept. 24, 1938] (St—14167); Tenney s.n. [June 22, 1931] (I). Washington Co.: D. Mc Lean 274 (St—17802). Woods Co.: P. J. White s.n. [July 4, 1900] (In). Woodward Co.: J. P. Kimball s.n. [Fort Supply, June 22, 1891] (Ka); L. F. Locke 15 (W—1582636). County undetermined: R. Bebb 4376 (Ok); Clifton 6 (Ok—10328); G. M. Merrill 625 (N); Sawyer & Schultz s.n. (Ok—10330); G. W. Stevens 875 1/2 (Ok), 2312 (Ok), A.1457 (Ok). TEXAS: Cook Co.: Straudtmann s.n. [July 26, 1941] (Au). Dallas Co.: Boll s.n. [1871] (Cb, Cb); J. Reverchon s.n. [Dallas, May 1877] (Bc); Mrs. J. P. Stephenson s.n. [Ennis, May 6, 1928] (Ld). Gonzales Co.: Tharp s.n. [Palmetto State Park, 6/26/39] (Au, Au). Grayson Co.: H. Gentry 316 (Au—122652); Hen-

nen 221 (St). Hemphill Co.: Cory 50269 (Au, Ca--754836, N, Sm, W--1885937); C. M. Rowell 4115 (Au--192086); Tharp 4502 (Au). Liberty Co.: Warner s.n. [Liberty] (Hu). Lipscomb Co.: A. H. Howell 64 (W--500189). Polk Co.: D. Lynch s.n. [August 8, 1947] (Au--122699). Red River Co.: E. Adams s.n. [6-19-37] (Nt). Tarrant Co.: Ruth 162 (Ll), s.n. [Fort Worth, Aug. 27, 1909] (Po--267629). Wheeler Co.: W. P. Taylor s.n. [Aug. 1, 1941] (Au). County undetermined: M. R. Stephenson 201 (W--1580539). NEW MEXICO: County undetermined: Mrs. O. Saint John s.n. [Uplands, Catskill, Aug. 1895] (Lb--9608). ARIZONA: Coconino Co.: B. L. Wagenknecht 4809 (Lw). WASHINGTON: Stevens Co.: Kreager 475, in part (Ca--882827, N, Pl--22578, Se--68370, Um--208, W--441291). MEXICO: Guerrero: F. A. Barkley 14079 (Au). CULTIVATED: Belgium: M. Martens s.n. [hort. insul. 1827] (Br), s.n. [h. b. lov. 1839] (Br). Denmark: Herb. Mus. Bot. Stockholm s.n. [Ex horto Havn.] (S). England: Stead s.n. [Liverpool Garden] (T). France: Herb. W. H. Harvey s. n. [h. R. P. 1820] (Du--166445). Germany: Collector undesignated s.n. (Gg--31415); Herb. Martius s.n. (Br); Rodrian s.n. [botan. Garten Heidelberg] (La). New Jersey: G. H. M. Lawrence P.528 (Ba); Lawrence & Lawrence P.240 (Ba). Pennsylvania: Martindale s.n. [Germantown, Sep. 1876] (W--771850); T. Meehan s.n. [1885] (Up--17125). Spain: Herb. Hort. Bot. Matrit. s.n. (Cp). Sweden: Herb. Beurling s.n. [1842] (S), s.n. [1844] (S). Switzerland: Herb. Hort. Bot. Basil. s.n. [1850] (M). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated 2109 (S), s.n. (S); Engelmann s.n. [Amer. bor.] (Br); Friesner s.n. (Bt--2484); Geyer 104 [near Missouri River] (W--71945); Herb. Molliano s.n. [Panzero] (Br); Herb. Torrey s.n. [North Fork of the Platte] (T); D. Houghton s.n. [Falls of St. Anthony, July 1832] (Mi); James s.n. [Long's 1st Exped.] (C); Werner s.n. [Aug. 30, 1885] (Ob--97294); A. Wood s.n. (Pa). MOUNTED ILLUSTRATIONS: C. A. Ripley s.n. [in color] (Ob); Curtis, Bot. Mag. 45: pl. 1976 [in color]. 1818 (N).

VERBENA STRICTA f. ALBIFLORA Wadmond, Rhodora 34: 19. 1932.

Synonymy: Verbena striata var. alba Popenoe ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena hastata x stricta Allen ex Moldenke, Résumé 365, in syn. 1959. Verbena stricta var. alba Fuller ex Moldenke, Résumé Suppl. 7: 10, in syn. 1963. Verbena stricta alba Gates ex Moldenke, Résumé Suppl. 7: 10, in syn. 1963. Verbena stricta f. alba Wadmond ex Moldenke, Résumé Suppl. 10: 7, in syn. 1964.

Bibliography: Wadmond, Rhodora 34: 19. 1932; Perry, Ann. Mo. Bot. Gard. 20: 286 & 356. 1933; Truman, Rhodora 40: 244--245. 1938; N. F. Petersen, Amer. Bot. 45: 166--167. 1939; Moldenke, Prelim. Alph. List Invalid Names 48. 1940; Moldenke, Suppl. List Invalid

Names 10. 1941; Moldenke, Alph. List Invalid Names 58. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 6, 7, 9, 11, 12, & 102. 1942; Moldenke, Castanea 10: 39. 1945; Moldenke, Phytologia 2: 74 & 117. 1945; Moldenke, Alph. List Cit. 1: 109, 217, 224, 244, & 267. 1946; Moldenke, Phytologia 2: 383. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 26. 1947; Moldenke, Alph. List Cit. 2: 391, 400, 401, 406, 514, 517, 520, 544, 605, & 620 (1948) and 3: 800, 826, 904, 927, & 949. 1949; Moldenke, Phytologia 3: 131. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 12, 14, 15, 17, 20, 21, & 199. 1949; M. L. Grant, Proc. Iowa Acad. Sci. 57: 118. 1950; Moldenke, Revist. Sudam. Bot. 8: 166. 1950; Fern. in A. Gray, Man. Bot., ed. 8, 1211. 1950; Moldenke, Phytologia 4: 67. 1952; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 129 (1952) and print. 2, 3: 129. 1958; Moldenke, Am. Midl. Nat. 59: 359. 1958; Moldenke, Résumé 16, 18, 19, 21, 23, 25, 26, 365, 374, & 474. 1959; Moldenke, Résumé Suppl. 1: 1 (1959), 2: 2 (1960), 3: 4—7 (1962), 4: 3 (1962), 6: 2 (1963), and 7: 2 & 10. 1963; Moldenke, Phytologia 9: 206 & 220. 1963; Steyerm., Fl. Mo. 1260, map 1842. 1963; Moldenke, Résumé Suppl. 10: 1 & 7 (1964) and 11: 3. 1964; Moldenke, Phytologia 11: 117 & 118. 1964.

This form differs from the typical form of the species in having its corollas purplish-white, nearly white, or pure-white.

The type of the form was collected by Samuel Christiensen Waldmond in southeastern Wisconsin. In the original description of the form no specific type is designated, but the author states that it is deposited in the Gray Herbarium of Harvard University. He says "seemingly rare; seen only once, along roadside where it was interspersed with the normal purple-flowered form." Other collectors describe the form as 2—3 feet tall, and it has been collected in sandy soil and sandy loam, in open upland forests, sandy or grazed pastures, sandy waste places, ditches and open roadside ditches, low marshy areas along small creeks, and sand of hog-lots, along rivers, roadsides, open roadsides, and railroad tracks, and on dry bottoms, hilly prairies, bare bluffs, and sand prairies, to 800 feet altitude, flowering from June to September, and fruiting from June to August.

Material has been identified and distributed in herbaria as V. stricta Vent. and as "Verbena stricta x —". The Cinq-Mars s.n. [31 juillet 1951] and A. S. Hitchcock s.n. [Ames, July '82] are mixtures with typical V. stricta Vent. Common names recorded for the plant are "hoary vervain" and "white-flowered verbena". In my 1940 publication I followed Perry (1933) in regarding it as synonymous with V. stricta, but I now regard color forms such as this as worthy of distinct nomenclatural recognition.

Verbena hastata x stricta Allen is apparently based on A. E. Allen s.n., collected at Peru, Nemaha County, Nebraska, on August 2, 1893, and deposited in the herbarium of William Jewell College at Liberty, Missouri; V. striata var. alba is based on E. A. Popenoe s.n. collected at Topeka, Shawnee County, Kansas, on July 23, 1879, and deposited in the herbarium of Iowa State College at

Ames, Iowa; V. stricta var. alba is based on G. D. Fuller 1123, collected in an open upland forest in Earl Township, Section 21, La Salle County, Illinois, on September 10, 1918, and deposited in the herbarium of the University of Illinois at Urbana; and V. stricta alba is based on F. C. Gates 3608, collected along the Illinois Central Railroad tracks southeast of Havana, Mason County, Illinois, on July 6, 1910, and is deposited in the herbarium of the University of Illinois.

Hayden says "a colony of pure white flowered plants was growing near the purple form" in Iowa, while Isely says "mixed with the blue form along roadside" and Harms found "a very large colony about 1/4 white" in the same state. Schneck comments "flowers all pure white; two stalks 4 feet apart standing among stalks that bore the usually colored flowers" in Illinois, while, in the same state, Chase says "locally not rare in sand prairie".

In Kansas Horr reports "about 50 plants growing with V. stricta in loam with fair moisture" and "not common in dry loam, grasslands", Morley discovered a "small group in grazed prairie pasture in sandy loam soil", and McGregor found a "large colony of white form in overgrazed sandy pasture" and a "colony of white form in prairie pasture ravine". Poindexter 201-68 was found in a broad ravine below a pond and proved to have 95 percent pollen fertility and a chromosome count of n = 7.

Over notes that in South Dakota "about 1 in every 100 was white". Terrell says "no color transition; with and outnumbering the typical form in sandy waste places by roadside" (in Wisconsin), Wallis reports "large colony, 25 percent white, 75 percent deep purple" (in Oklahoma), and Demaree notes "all these were white, many others were blue" (in Arkansas). The Davidson, Dixit, & Romberg 4689, cited below, is described by the collectors as "flowers white and lavender" and so is probably a mixture with f. roseiflora Benke.

Truman (1938) says: "In the summer of 1934 the writer observed a very few plants of Verbena stricta Vent. forma albiflora Wadmond .....scattered in a patch of the typical purple-flowered form of V. stricta in a pasture about two miles east of Rockton, Illinois, and several miles to the west of the station reported by Wadmond.. in 1932. Continued observation of the colony during the summer of 1935 and 1936 revealed the fact that the white-flowered form was increasing in numbers and spreading to the adjacent roadside. In 1937 it was noted that not only had this form increased in its importance in the original station, but also that several specimens had appeared in a farmyard a half mile distant. Members of the family living upon the farm where the white-flowered form was first noted remember that in 1933 the station consisted entirely of purple-flowered plants. Their observation is not reliable, however, for in 1934 the relative number of white-flowered plants was so small as to be evident only to a practised observer.

"This form differs from the typical V. stricta not only in that its flowers are pure white, but also that its stems completely lack

the purple color that is invariably characteristic of the purple-flowered form. These differences seem to indicate that some change has taken place in the genetic make-up of the plant to inhibit the development of the pigment, presumably anthocyanin, which gives the typical form its color. In all other respects the white-flowered form resembles the typical, although in a dozen specimens tagged at random early in the season and collected near the end of the flowering period for the purpose of obtaining seeds, the white-flowered plants were all notably taller, sturdier plants than the purple-flowered. This difference may have been purely accidental. At no time in the four years in which this station has come under the observation of the writer has there appeared any intermediate form. All individuals have been either typical V. stricta, or pure white. It is interesting to note here that this lack of intermediates has been observed by Benke..... where V. stricta Vent. forma roseiflora Benke grows with typical V. stricta. A rather careful reconnaissance of the locale of the Wadmond collections failed to reveal any plants of the white-flowered form remaining in 1937."

The corollas are reported as "white" on Clinton s.n., Demaree 278888, Herb. Univ. Nebr. 364, Kellerman s.n., Over 14386, Seymour s.n., and Smyth 3061; as "pure white" on V. H. Chase 7852, A. Hayden 3001, and Schneck s.n.; as "nearly white" on Popenoe s.n. and Sheldon s.n.; and as "purplish-white" on Grace 363.

Steyermark (1963) records this form from Daviess, New Madrid, Ozark, Saint Louis, and Stone Counties, Missouri, on the basis of specimens preserved in the herbarium of the Missouri Botanical Garden at St. Louis, but not as yet seen by me.

In all, 54 herbarium specimens, including type material of most of the names involved, have been examined by me.

Citations: QUEBEC: Deux-Montagnes Co.: Cinq-Mars s.n. [31 juillet 1951] (Mg, Vi). ILLINOIS: Cass Co.: Seymour s.n. [Chandlerville, July 6, 1886] (Ur--30015). Henderson Co.: H. N. Patterson s.n. [Oquawka, August 1872] (N), s.n. [August 1873] (Al). LaSalle Co.: G. D. Fuller 1123 (Ur). Mason Co.: B. E. Clinton s.n. [Havana, June 21, 1894] (Ur); F. C. Gates 3608 (Ur). Sangamon Co.: Ahles 4592 (Ur); Winterringer 7333 (Il--36465). Tazewell Co.: V. H. Chase 7852 (Ur). Wabash Co.: Schneck s.n. [Mt. Carmel, July 1883] (Ur). Winnebago Co.: Wadmond s.n. [Roscoe, Aug. 16, 1931] (Ur). IOWA: Butler Co.: Isely 6508 (Gg--406216). Dickinson Co.: A. Hayden 3001 (Io--149002, N). Harrison Co.: V. L. Harms 601 (Lw). Story Co.: A. S. Hitchcock s.n. [Ames, July '82] (Io--15322). WISCONSIN: Crawford Co.: Terrell 2418 (Ws). LaCrosse Co.: Hartley 1499 (Ws). MINNESOTA: Hennepin Co.: F. H. Burglehaus s.n. [Aug. 1892] (Ob--50836). SOUTH DAKOTA: Roberts Co.: Over 14386 (W--1242264). KANSAS: Barber Co.: R. L. McGregor 14600 (Lw); J. D. Poindexter 201-68 (Lw). Comanche Co.: R. L. McGregor 14578 (Lw),

11679 (Lw). Decatur Co.: V. L. Harms 1276 (Lw). Greenwood Co.: J. Engleman 1079 (Ok). Marshall Co.: W. H. Horr 4556 (Lw). Montgomery Co.: R. L. McGregor 15052 (Lw). Osborne Co.: Shear 149 (Ca--882822, W--227296). Republic Co.: G. E. Morley 1302 (Lw). Riley Co.: Kellerman s.n. [Manhattan, 6-30-1887] (Ka). Shawnee Co.: E. A. Popenoe s.n. [Topeka, July 23, 1879] (Io--140912), s. n. [Topeka, July 24, '79] (W--1119632); B. B. Smyth 3061 (Ka--79497). Washington Co.: W. H. Horr 4622 (Lw). MISSOURI: Saint Clair Co.: Steyermark 82192 (Lb--44931). ARKANSAS: Stone Co.: Demaree 27888 (N), 278888 (Ok, St). NEBRASKA: Custer Co.: Herb. Univ. Nebr. 364 (Au). Grant Co.: Rydberg 1122, in part [in the Lake Region of Grant County, 2 miles NE of Whitman, Central Nebraska, Aug. 1, 1893] (W--210364). Lancaster Co.: J. L. Sheldon s.n. [Lincoln, 8.11.98] (We). Nemaha Co.: A. E. Allen s.n. [Peru, Aug. 2, 1893] (Je). Thomas Co.: Krautter s.n. [Halsey, July 23, 1907] (Up--45722). Valley Co.: Davidson, Dixit, & Romberg 4689, in part (Au--122711). OKLAHOMA: Cherokee Co.: C. S. Wallis 794 (St), 3395 (Au--122708, Au--122710, St). Logan Co.: Grace 363 (Ok--19027). Marshall Co.: Alder s.n. [July 10, 1950] (Ok).

VERBENA STRICTA f. ROSEIFLORA Benke, Rhodora 34: 10. 1932.

Bibliography: Schaffner, Ohio Nat. 7: 31--34. 1906; Benke, Rhodora 34: 10. 1932; Perry, Ann. Mo. Bot. Gard. 20: 286, 287, & 356. 1933; Truman, Rhodora 40: 245. 1938; F. C. Gates, Fl. Kans. 191. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 6, 8, 9, & 102. 1942; Moldenke, Alph. List Cit. 1: 200 (1946), 2: 361 & 492 (1948), and 3: 827, 927, & 954. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 12, 15, 17, 19--21, & 199. 1949; M. L. Grant, Proc. Iowa Acad. Sci. 57: 118. 1950; Fern. in A. Gray, Man. Bot., ed. 8, 1211. 1950; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 129. 1952; Moldenke, Phytologia 4: 67 (1952) and 4: 185. 1953; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 2, 3: 129. 1958; Moldenke, Résumé 16, 19, 21, 22, 24, & 474. 1959; Moldenke, Résumé Suppl. 2: 2 & 3 (1960), 3: 7 (1962), and 4: 3. 1962; Steyerm., Fl. Mo. 1260. 1963; Moldenke, Résumé Suppl. 10: 1. 1964.

This form differs from the typical form of the species in having its corollas light-pink, pink, light-rose, rose-colored, rose-red, or roseate to lavender.

The plant is described as 2--3 feet tall. The type of the form was collected by Hermann Conrad Benke (no. 5164) at Concordia, Cloud County, Kansas, on July 24, 1929, and is deposited in the herbarium of the Chicago Natural History Museum. The collector says "High ridges and hills in long slopes rise from valleys far below in north central Kansas, each with its distinctive flora -- very luxuriant in the valley. About Concordia, among its most common plant life is Verbena stricta Vent., acres in extent. Hardly, however, is it to be classed as a weed, for it thrives on-

ly in limited areas and at limited times, certain soil conditions seeming to be necessary for its maintenance. The only area where the roseate-corolla form of this plant has been seen in my experience lies to the northwest of the city. Here, in a field of creek bottom some twenty acres in extent, was found an almost solid mass of the species in the usual purplish-blue, with lesser patches, here and there -- about a quarter part of all -- of the rose-colored form. This variation in color made a very charming impression in the landscape's features. With no intermediate colors to confuse....."

The form has been found along roadsides and open roadsides, in loam soil, dry or sandy loam, black loam and loam with fair soil moisture, on prairies, and along railroads, in grasslands, grassland pastures, severely overgrazed creek valley pastures, and ravines in prairie pastures, flowering and fruiting from June to September. Harms found it "scattered in large colony of the blue form" and "scarce in large colony of V. stricta" in Kansas, while Benke says that "in a field of some 20 acres about a quarter of the plants were of this color form" in the same state. Also in Kansas, McGregor reports "this form common with the species", while Horr says "a few specimens here" and "a large colony with the blue and white forms" and Morley encountered "one colony in overgrazed prairie pasture in loam soil not too far from small creek" (no. 464), "one or two plants found with very light corollas, thin loam over sandstone soil in grazed prairie pasture" (no. 376), and "one large plant of this very light color found" (no. 396).

Fernald & Pease emphasize that the "fresh" corollas were roseate. Schaffner (1906) describes a "pinkish-white" mutant which he found abundantly over acres of ground in Clay County, Kansas, along with the typical form or by itself. He notes that it is obviously a stable mutant. It is possible that he is referring here to f. albiflora Wadmond, but more probably to f. roseiflora Benke. Grant (1950) records it from Dickinson County, Iowa. C. L. Kucera, in a letter to me dated February 2, 1955, states that there are no specimens of this form in the University of Missouri herbarium and that he cannot recall ever having seen it in that state.

The flowers are described as "pink" on Horr 4660 and Spillman s.n.; as "light-pink" on Seymour s.n.; as "light-rose" on McGregor 15170; as "light-rose or pink" on Harms 1313; as "roseate" on Benke 5164 and Fernald & Pease 3496; as "lavender" on Porter 3413; and as "white and lavender" on Davidson, Dixit, & Romberg 4689 (probably a mixture with f. albiflora Wadmond).

Perry (1933) cites in addition Benke 5164 (G--isotype), not as yet seen by me.

In all, 24 herbarium specimens, including the type collection, have been examined by me.

Citations: ILLINOIS: LaSalle Co.: G. D. Fuller 2299a (Il—

15801). Marshall Co.: V. H. Chase 11151 (Ur). McHenry Co.: Benke 6150 (N). Sangamon Co.: Seymour s.n. [Springfield Junct., July 8, 1879] (Ur—17464). Vermilion Co.: Ahles 8092 (Ur). MICHIGAN: Dickinson Co.: Fernald & Pease 3496 (Mi). WISCONSIN: Rock Co.: E. W. Fell 57-824 (Ws). KANSAS: Cloud Co.: Benke 5164 (N—isotype, W—1515910—isotype). Jewell Co.: W. H. Horr 4774 (Lw). Kiowa Co.: R. L. McGregor 15170 (Lw). Morris Co.: R. L. McGregor 4356 (Lw). Republic Co.: G. E. Morley 376 (Lw), 396 (Lw), 464 (Lw), 794 (Lw). Russell Co.: V. L. Harms 721 (Lw). Smith Co.: V. L. Harms 1313 (Lw, N). Washington Co.: W. H. Horr 4660 (Lw). MISSOURI: County undetermined: Spillman s.n. [s.w. Mo., Aug. '89] (Pl—22614). NEBRASKA: Valley Co.: Davidson, Dixit, & Romberg 4689, in part (Ur). WYOMING: Weston Co.: C. L. Porter 3413 (Au). OKLAHOMA: Cherokee Co.: C. S. Wallis 645 (St).

VERBENA STRIGOSA Cham., Linnaea 7: 256—257. 1832 [not V. strigosa Hook., 1836].

Bibliography: Cham., Linnaea 7: 256—257. 1832; Steud., Nom. Bot., ed. 2, 2: 750. 1841; D. Dietr., Syn. Pl. 3: 602. 1843; Walp., Repert. 4: 23. 1845; Schau. in A. DC., Prodr. 11: 540. 1847; Schau. in Mart., Fl. Bras. 9: 186. 1851; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Dusén, Arch. Mus. Nac. Rio Jan. 13: 36 & 94. 1903; Hayek, Denkschr. Kaiser. Akad. Wissensch. Math.-nat. 79 (1): 294. 1908; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 39 & 102. 1942; Moldenke, Alph. List Cit. 1: 289 (1946) and 2: 598 & 624. 1948; Moldenke, Castanea 13: 117. 1948; Moldenke, Alph. List Cit. 3: 688, 840, & 921—923 (1949) and 4: 1249. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94 & 199. 1949; Stellfeld, Trib. Farmac. 19 (10): 167. 1951; Moldenke, Phytologia 4: 188. 1953; Rambo, Sellowia 7: 260 & 288. 1956; Angely, Fl. Paran. 7: 13. 1957; Reitz, Sellowia 11: 57 & 134. 1959; Moldenke, Résumé 111 & 474. 1959; Angely, Fl. Paran. 16: 79 (1960) and 17: 47. 1961; Moldenke, Phytologia 9: 289 & 292. 1963.

Small erect shrub, much branched, softly strigose-hirsute and incanous throughout, varying to subsericeous or very rarely almost glabrous; stems 30—45 cm. tall, as thick as the quill of a crow's feather at the base, simple at the base, much branched above, often deliquescent; branches tetragonal, with much smaller leaves or almost leafless above; leaves decussate-opposite, sessile or obscurely petiolate, the blades coriaceous to membranous, elliptic, varying from shorter than to as long as or even longer than the internodes, decreasing in size upwards, 8—12 mm. wide, more or less attenuate into the petiole at the base, obtusely crenate or acutely serrate with a few teeth toward the apex, entire and subcuneate at the base, 3-nerved at the base, the venation impressed above, prominulous beneath, the midrib usually pinnate above; inflorescence borne at the apex of the branches, single or ternate to quinate; spikes usually terminal, 4—20-flowered, mostly few-

flowered, rather lax, solitary or densely cymose to racemose-paniculate on many axillary branchlets; bractlets broadly ovate, 1/4 to 1/3 as long as the calyx, concave, acute at the apex, ciliate; calyx membranous, about 4 mm. long, ampliate above, with herbaceous ribs, glabrous below and between the ribs, sparsely strigose on the angles above, short-ciliate, the teeth broadly triangular, very short, equal, apiculate at the apex; corolla pale-blue or blue to violet, rose, or red, clavate-cylindric, about 4.5 mm. long, lanuginous on the outside of the exserted portion, very densely barbate in the throat with very elegant moniliform exserted hairs, its limb medium-sized, the lobes cuneate, retuse at the apex; fruit about 2 mm. long; cocci ferruginous and striate on the back, rugose-areolate above, the commissural surface angular, rather broad, white-granular.

The type of this species was collected by Friedrich Sellow in São Paulo, Brazil, in or before 1832, and was deposited in the herbarium of the Botanisches Museum in Berlin, where it was photographed by Macbride as his type photograph no. 17448, but is now destroyed. Walpers (1845) places the species in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Micranthae, and Secondary Subgroup Holophyllae with 22 other species. Schauer (1847) says "Praecedentis [V. hirta] formis parvifoliis quodammodo similis, sed jam calycis dentibus corollaeque barba magis conspicua discernenda. Variat foliorum figura et magnitudine neque minus indumento nunc sericeo nunc rarissimo ut planta fere glabra appareat". In his 1851 work he amplifies this to "V. hirtae formis parvifoliis primo obtitu persimilis, sed praeter alia calicis dentibus brevissimis latis apiculatis nec subulatis, corollaeque barba magis conspicua discernitur. Variat foliis basi magis minusve attenuatis, obtuse et acute serratis, neque minus indumento modo subsericeo modo rarissimo, ut planta fere glabra appareat."

It has been collected on campos, dry grassy campos, and rocky crests, in grassy places, shrubby fields, bogs, and pinewoods, from 750 to 2100 meters altitude, blooming in April, May, August, and October to February, fruiting in December. Rambo collected it in a region of 2 meters rainfall, rare snows, and 0—24 degrees temperatures. Dusén (1903) says that it grows "In silvula ad marginem viae" and "in silva primaeva ad marginem viae" in São Paulo. Common names recorded for it are "camaradinha", "formosa sem dote", and "jurupeba", names apparently applied to almost all the species of the genus in southern Brazil. The V. strigosa of Hooker is V. xutha Lehm. The Dusén 313, distributed as V. strigosa, is actually V. lobata Vell. Rambo 49319 is said to have had blue flowers, and Hatschbach 4216 had violet ones.

Schauer (1847) cites Riedel s.n. and Sellow s.n. from São Paulo in the Leningrad and Berlin herbaria, while Hayek (1908) cites Wacket s.n. and Wettstein & Schiffner s.n. from the same state.

In all, 30 herbarium specimens, including the type collection, and 9 mounted photographs have been examined by me.

Citations: BRAZIL: Paraná: Dusén 7969 (S); Hatschbach 4216 (Ok),

4217 (Ok); Herb. Mus. Nac. Rio Jan. 46595 (Ja); Jönsson 1209a (S, W—1481970); M. Kuhlmann s.n. [Villa Velha, Aug. 28, 1939] (N, Sp-41551); Rambo 36421 (N). Rio Grande do Sul: Rambo 30981 (N), 32450 (N), 34728 (S), 49319 (S); Sehnem 5155 (B). Santa Catarina: Reitz 3280 (N), 3404 (S), 3417 (N); Smith & Klein 8101 (Ok, W—2251344), 11107 (W—2251751, Z); Smith & Reitz 9994 (W—2249364), 10024 (Ok, W—2251638), 10163 (W—2249366). São Paulo: Herter 4360 (N); Sellow 4939 (Vt), s.n. [Brasilia; Macbride photos 17448] (Br—isotype, F—photo of isotype, Kr—photo of isotype, N—photo of isotype, N—isotype, N—photo of type, N—photo of isotype, N—photo of type, Si—photo of isotype, Vt—isotype, Z—photo of type, Z—photo of isotype).

VERBENA SUBPALUDOSA Malme ex Angely, Fl. Paran. 17: 47, nom. nud. 1961.

Bibliography: Angely, Fl. Paran. 17: 47. 1961; Moldenke, Résumé Suppl. 7: 5. 1963.

Nothing whatever is known to me about this species except that it is recorded by Angely from Paraná, Brazil. I cannot find that Malme ever published the name.

VERBENA SUBULIGERA Greene, Pittonia 1: 156. 1888.

Synonymy: Verbena subligera Greene ex Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 19 & 102, sphalm. 1942.

Bibliography: Greene, Pittonia 1: 156. 1888; Durand & Jacks., Ind. Kew. Suppl. 1: 451.1906; Perry, Ann. Mo. Bot. Gard. 20: 249, 250, 262, 303—304, & 356. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 19 & 102 (1942) and [ed. 2], 33 & 199. 1949; Moldenke, Alph. List Cit. 4: 1292. 1949; Moldenke, Résumé 40 & 474. 1959; Moldenke, Résumé Suppl. 2: 4, 13, & 15. 1960; Moldenke, Phytologia 9: 195 (1963) and 10: 140. 1964.

Stems probably several from a common base, procumbent, hirsute-pubescent; leaves decussate-opposite, the blades ovate, 1.5—4 cm. long, gradually narrowed into a subpetiolar base, pinnately cleft, appressed-hirsute on both surfaces, especially beneath on the somewhat prominently reticulate venation, the larger segments incised or sharply dentate; spikes short-pedunculate, elongate, conspicuously bracteate, interrupted in fruit; bractlets lanceolate-subulate, twice as long as the calyx, ascending-spreading, reflexed in age, hirsute; corolla-tube scarcely longer than the calyx; fruiting-calyx about 3 mm. long, pubescent, hirsute on the venation, the lobes very short, strongly connivent over the schizocarp; cocci subcylindric-trigonous, about 2 mm. long, only faintly striate, the commissural surface muriculate or smoothish, not reaching the top of the nutlet.

The type of this little-known endemic species was collected by A. Forrer in the Sierra Madre west of Durango, Durango, Mexico, at an altitude of 8100 feet, in September or October, 1881. The species has been found in pinewoods and on pine-covered mountains and mountaintops, at altitudes of 2400 to 2700 meters, flowering

and fruiting from August to October. Material has been misidentified and distributed in herbaria as V. bracteata Lag. & Rodr.

Perry (1933) cites the following 3 additional specimens not as yet seen by me: MEXICO: Durango: Forrer s.n. [Sierra Madre, September and October 1881] (D--isotype, F--isotype, G--isotype). The isotype which she cites from "NY" is actually in the Columbia University herbarium. She notes that "Although the general habit of this species is much like that of V. bracteata, the latter differs in having obtusish leaf-segments and sharply reticulate-striate nutlets with commissural faces fully as long as the nutlet."

In all, 9 herbarium specimens, including type material of all the names involved, have been examined by me.

Citations: MEXICO: Durango: Forrer s.n. [Sierra Madre, September and October 1881] (C--isotype, Ca--170277--isotype, I--isotype, I--isotype, W--1465960--isotype, W--1465961--isotype); Waterfall 12703 (Mi, St), 15504 (St).

xVERBENA SUKSDORFI Moldenke, Phytologia 2: 150--151. 1946.

Synonymy: Verbena officinalis x prostrata Dermen, Cytologia 7: 170. 1936. Verbena suksdorfii Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212, sphalm. 1951. Verbena lasiostachys var. septentrionalis Moldenke x V. officinalis L. ex Moldenke, Résumé 368, in syn. 1959. Verbena officinalis L. x V. lasiostachys var. septentrionalis Moldenke, Résumé 371, in syn. 1959.

Bibliography: Dermen, Cytologia 7: 170. 1936; Moldenke, Phytologia 2: 150--151. 1946; H. N. & A. L. Moldenke, Pl. Life 2: 84. 1948; Moldenke, Alph. List Cit. 2: 495 (1948) and 4: 981. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 164 & 199. 1949; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Am. Midl. Nat. 59: 361--362. 1958; Moldenke, Résumé 224, 368, 371, 421, & 474. 1959; Moldenke, Phytologia 8: 121. 1961; Moldenke, Résumé Suppl. 3: 41. 1962; Moldenke, Phytologia 10: 210 & 211. 1964.

Tall herb, apparently a natural or artificial hybrid between V. officinalis L. and V. lasiostachys var. septentrionalis Moldenke, with intermediate characters; stems rather stout, obtusely tetragonal below, sharply angled above, light-colored, rather abundantly short-pubescent toward the base with stiff whitish often bulbous-based hairs less than 1 mm. long, less densely so toward the apex and on the branches, peduncles, and rachis, but sufficiently abundant throughout to impart a very rough and harsh feel to these organs especially when the finger is moved downwards, the uppermost portions of the stem with margined angles, the stems, branches, and peduncles also very densely fine-puberulent with microscopic (almost punctiform) hairs, the rachis more conspicuously puberulent with longer whitish forward-pointing hairs; principal internodes mostly elongate, 3--8 cm. long; leaves decussate-

opposite, usually with clusters of smaller ones on greatly abbreviated branches in their axils; nodes plainly annulate; petioles 1—2 cm. long, broadly winged and not plainly distinguishable from the blades into which they grade; leaf-blades rather thick and firm, very harsh to touch on both surfaces, very brittle in drying, to about 9 cm. long, varying from deeply 3-fid to undivided and merely laciniate-incised along the margins, ovate in outline, the two basal lobes on the largest leaves usually wide-spreading, giving the blade a width of 5.5 cm. at the base, incised-laciniate, the margins more or less revolute, more or less densely short-pubescent on both surfaces with stiff forward-pointing bulbous-based hairs, more densely and lastingly so on the venation beneath; inflorescence copiously branched at the apex of the stem; spikes greatly elongate, usually 15—40 cm. long, densely many-flowered, but apparently not setting fruit; peduncles mostly abbreviated, acutely tetragonal, margined; bractlets ovate, about 2 mm. long, 0.5—1 mm. wide at the base, ciliate-margined to the apex, puberulent on the back, acuminate, keeled; calyx slightly longer than the subtending bractlet, about 3 mm. long, whitish-strigose; corolla-tube equaling the calyx, its limb about 2 mm. wide.

The type of this remarkable plant was collected by Wilhelm Nikolaus Suksdorf — in whose honor it is named -- in a garden at Bingen, Klickitat County, Washington, on November 21, 1904, and is deposited in the herbarium of the State College of Washington at Pullman. The plant seems definitely to be a hybrid because the greatly elongated spikes in the only three specimens seen contain hundreds of mature calyxes, but not a single fruit. The other described natural hybrids in this genus are also noteworthy for the paucity in fruiting, but none has the lack of fruit so complete as in this one. The same hybrid has apparently been produced artificially by Dermen and is referred to by him as V. officinalis x prostrata. The source of Suksdorf's plant is not known, and neither parent is known from the wild in Washington. It may be distinguished from V. officinalis in having its spikes much elongate, 6—16 inches long and densely flowered, the flowers subimbricate, the leaves mostly trifid, the calyx about 3 mm. long, and by the fact that it sets hardly any fruit. From V. lasiostachys and its varieties it may be distinguished by the fact that the spikes are merely strigillose or puberulent and do not set fruit well, if at all.

In all, 3 herbarium specimens, including type material of most of the names involved, a 2 mounted photographs have been examined by me.

Citations: CULTIVATED: Washington: Suksdorf s.n. [Sept. 25, 1904] (Pl—138360), s.n. [Nov. 21, 1904] (N—isotype, N—photo of type, Pl—138361—type, Z—photo of type).

VERBENA SULPHUREA D. Don in Sweet, Brit. Flow. Gard., ser. 2, 3: pl. 221. 1834.

Synonymy: Shuttleworthia diceras Meisn., Pl. Vasc. Gen. 2: 198.

1839. Shuttleworthia sulphurea Meisn., Pl. Vasc. Gen. 2: 198. 1839. Uwarowia chrysanthemifolia Bunge, Bull. Sci. Acad. Pétersb. 7: 278. 1840. Shuttelworthia diceras Meisn. ex Steud., Nom. Bot., ed. 2, 2: 575 & 750. 1841. Shuttelworthia sulphurea Meisn. ex Steud., Nom. Bot., ed. 2, 2: 575 & 750. 1841. Verbena diceras Bert. ex Steud., Nom. Bot., ed. 2, 2: 750, in syn. 1841. Schuttleworthia dissecta Walp. apud Schau. in A. DC., Prodr. 11: 551, in syn. [as "Schuttlew."]. 1847. Uwarowia sulphurea Bunge apud Schau. in A. DC., Prodr. 11: 551, in syn. 1847. Verbena dissecta Poepp. ex Schau. in A. DC., Prodr. 11: 551, in syn. 1847 [not V. dissecta Morong, 1904, nor Schau., 1959, nor Willd., 1825]. Verbena sulfurea Sweet apud Schau. in A. DC., Prodr. 11: 551. 1847. Verbena sulphurea Sweet apud C. Gay, Hist. Fis. Chile Bot. 5: 8. 1849. Schuttleworthia sulfurea Meisn. apud C. Gay, Hist. Fis. Chile Bot. 5: 8, in syn. 1849. Uwarowia sulphurea Schau. apud Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1161, in syn. 1895. Verbena sulfurea α normalis Kuntze, Rev. Gen. Pl. 3 (2): 258. 1898. Verbena sulfurea D. Don apud Solered., Bull. Herb. Boiss., sér. 1, 6: 627. 1898. Shuttleworthia dissecta Walp. apud Reiche, Fl. Chile 5: 289, in syn. 1910. Shuttleworthia sulfurea Meisn. apud Reiche, Fl. Chile 5: 289, in syn. 1910. Glandularia sulphurea (D. Don) Schnack & Covas, Darwiniana 6: 475. 1944. Glandularia sulfurea Schnack & Covas, Darwiniana 7: 72. 1945. Verbena sulfurea Sw. ex Moldenke, Résumé 376, in syn. 1959. Verbena dissecta Walp. ex Moldenke, Résumé Suppl. 3: 37, in syn. 1962. Verbena lobata Meisn. ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963 [not V. lobata Arrab., 1841, nor Vell., 1825].

Bibliography: Sweet, Brit. Flow. Gard. 6 [ser. 2, 3]: pl. 221. 1834; Lindl. in Edwards, Bot. Reg. 21: pl. 1748 & 1766. 1835; Meisn., Pl. Vasc. Gen. 2: 198. 1839; G. Don in Loud., Hort. Brit. Suppl. 2: 680. 1839; Bunge, Bull. Sci. Acad. Pétersb. 7: 278. 1840; Fisch. & Mey., Mém. Acad. St. Pétersb., ser. 6, 6 (2): 153—156. 1840; Steud., Nom. Bot., ed. 2, 2: 575 & 750. 1841; Walp., Nova Act. Acad. Nat. Caes. Leopold.-Carol. Cur. 19: Suppl. 1: 379. 1843; D. Dietr., Syn. Pl. 3: 605. 1843; Walp., Repert. 4: 12. 1845; Schau. in A. DC., Prodr. 11: 551. 1847; C. Gay, Hist. Fis. Chile Bot. 5: 8—10. 1849; R. A. Phil., Fl. Atac. 40. 1860; R. A. Phil., Viaje Des. Atac. 20, 25, & 214. 1860; Bocq., Adansonia 2: 126, pl. 11. 1861—1862; Bocq., Rév. Verbénac. 46. 1862; R. A. Phil., Anal. Univ. Chile 35: 190. 1870; Lorentz & Niederlein, Exped. Rio Negro 2 (bot.): 255. 1881; F. Phil., Cat. Fl. Vasc. Chil. 221. 1881; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 147 & 148, fig. 57E. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 895, 1161, 1178, & 1179. 1895; Kuntze, Rev. Gen. Pl. 3 (2): 258. 1898; Solered., Bull. Herb. Boiss., sér. 1, 6: 627. 1898; Macloskie in W. B. Scott, Rep. Princeton Univ. Exped. Patag. 8 (2): 688. 1905; Briq., Ann. Conserv. & Jard. Bot. Genèv. 10: 104. 1907;

Reiche, Fl. Chile 5: 273 & 289--290. 1910; Hauman-Merck, Anal. Mus. Argent. Hist. Nat. Buenos Aires 24: 414. 1913; Sanzin, Anal. Soc. Cientif. Argent. Buenos Aires 88: 97, 98, 124, 127, 128, & 134. 1919; Hegi, Illustr. Fl. Mittel-Eur. 5 (3): 2239. 1927; I. M. Johnst., Contrib. Gray Herb. 85: 100--101. 1929; Stapf, Ind. Lond. 6: 403 & 431. 1931; Moldenke, Suppl. List Invalid Names 8 & 10. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42, 74, & 102. 1942; Moldenke, Alph. List Invalid Names 46 & 51. 1942; Raimondi, Bol. Mus. Hist. Nat. Jav. Prado 7: 244. 1943; Moldenke, Lilloa 10: 345. 1944; Schnack & Covas, Darwiniana 6: 471, 473, & 475 (1944) and 7: 72. 1945; Cabrera, Bol. Soc. Argent. Bot. 1: 67. 1945; Indic. Taxonom. 1 (14--16): 6. 1945; Moldenke, Alph. List Cit. 1: 39, 221, & 356. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 10 & 20. 1947; Moldenke, Alph. List Cit. 2: 411, 560, 561, 671, 672, 749, 750, 811, 872, & 940 (1948) and 4: 1115, 1175, 1187, 1191, 1209, 1215, 1233, & 1302. 1949; Moldenke, Known Geograph. Distrib. Verbenac., [ed. 2], 102, 164, & 199. 1949; C. Skottsberg, Medd. Göt. Bot. Trädg. 18: 151. 1950; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 65--66. 1951; Moldenke, Inform. Mold. Set 46 Spec. 4. 1951; Moldenke, Phytologia 3: 468. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 101. 1953; Moldenke, Phytologia 5: 96. 1954; Moldenke, Inform. Mold. Set 48 Spec. [4] (1954), 49 Spec. 3 (1954), and 51 Spec. 4. 1956; Muñoz Pizarro, Sin. Fl. Chil. 199, pl. 96 c--e. 1959; Moldenke, Résumé 122, 224, 296, 344, 355, 363, 376, & 474. 1959; Moldenke, Résumé Suppl. 2: 10 & 11 (1960) and 3: 15, 35, & 37. 1962; Moldenke, Phytologia 8: 192 & 204 (1962), 8: 461 (1963), and 9: 67, 70, 72, 117, 130, & 192. 1963; Moldenke, Résumé Suppl. 6: 11 (1963) and 7: 8 & 10. 1963; Moldenke, Phytologia 9: 397 (1964), 10: 299 (1964), and 11: 21 & 62. 1964.

Illustrations: Sweet, Brit. Flow. Gard. 6 [ser. 2, 3]: pl. 221 [in color]. 1834; Lindl. in Edwards, Bot. Reg. 21: pl. 1748 [in color]. 1835; Fisch. & Mey., Mém. Acad. St. Pétersb., ser. 6, 6 (2): 156 [in color]. 1840; Bocq., Rév. Verbénac. pl. 11. 1862; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 147, fig. 57E. 1894; Sanzin, Anal. Soc. Cientif. Argent. Buenos Aires 88: 128. 1919; Muñoz Pizarro, Sin. Fl. Chil. pl. 96 c--e. 1959.

Robust hairy perennial herb or suffruticose, green or cinereous, 20--60 cm. tall, the pubescence often villous or hispid and ashy-gray; stems variable, procumbent or creeping, herbaceous or sometimes slightly woody at the base, spreading or ascending, branched; branches ascending or erect, tetragonal, hirsutulous, leafless and merging into the peduncle at the apex; leaves decussate-opposite, usually with many small ones fascicled in their axils, multipartite to tripartite, pinnatifid or subbipinnatifid, entire at the petiolar base, 1.5--3 cm. long, strigose-hispidulous on both surfaces, the lower ones remote, the segments all narrow or linear, rather uniform, simple and entire or trifid, obtuse at the apex, widespreading, subrevolute or revolute along the margins; inflorescence capitate-globose, usually not elongating after anthesis, pedunculate; heads many-flowered; peduncles short or elongated, leafless;

bractlets subulate or lanceolate, 3--6.5 mm. long, acuminate at the apex, varying from one-third as long to almost equaling the calyx, canescent-hirsute; calyx clavate-tubular or narrow-cylindric, 6--8 (--12) mm. long, plicately 5-angled, canescent-hirsutulous, the 5 teeth short, unequal, 0.5--1.5 mm. long, acute at the apex; corolla hypocrateriform, rather large, varying from yellow, pale-yellow, or lemon-yellow to pale sulphur-yellow or cream-yellow, its tube usually 9--10 mm. long, glabrous on the outside, glabrous or sparsely pilose within with moniliform hairs below and awl-shaped retrorse more dense hairs toward the apex, the limb 5-parted, about 8 mm. wide, barbate in the throat and at the mouth, the lobes cuneate, 3--3.5 mm. long, 2.5--3.2 mm. wide, deeply retuse at the apex; anther-appendages varying from violet or dark-violet to chocolate-brown or black, large, clavate, 1.2--1.3 mm. long, long-exserted from the corolla-throat, recurved; style about 7.5 mm. long; cocci 4 or by abortion only 3 or 2, reticulate-rugose on the back, about half as long as the fruiting-calyx; chromosome number: 2n = 10.

This is apparently a very variable species or else several taxa are herein included. It has been collected in sandy soil on sandy flats, dry sandy hills and slopes, low hills and arid sandy hillsides, dunes, and huge sand-dunes by the sea, at altitudes from sea-level to 400 meters, flowering from August to December, fruiting in October. Morrison says of it "not common on low hills in sandy soil just back from the ocean". A common name is "sulphur verbena". The plant has been in cultivation since 1832 in England, 1841 in Switzerland, 1843 in Italy, and 1848 in Belgium. Reiche notes that it is a very ornamental plant, occurring naturally from Atacama to the Araucaria zone in Chile, both on the coast and in the mountains, and that it also occurs in Peru. Schauer (1847) actually cites a Meyen s.n. from "in Peruvia ad Chuquito", while Raimondi (1943) cites his no. 9324 from Junin, Peru, and no. 10562 from Huánuco, Peru, but of the latter he says "Flores de color morado claro". Walpers (1845) also cites the species from Peru ["Chuquito" -- apparently Meyen's collection]. I have not as yet seen any material of V. sulphurea from Peru, and in view of Raimondi's statement about the color of the flowers, I suspect that the Peruvian records may be based on misidentifications.

I. M. Johnston (1929) asserts that the "Verbena sulphurea" and "V. erinoides" of Philippi, Fl. Atac. 40 and Viaje Des. Atac. 20, 25, & 214 (1860) are actually V. atacamensis Reiche. Skottsberg & Skottsberg 843 was first identified as V. porrigens R. A. Phil., then as V. berterii Schau. and so cited by me in Lilloa 10: 345 (1944), but seems to be V. sulphurea instead.

Shuttleworthia diceras was based on nos. 1392 and 1809, collected by Carlo Giuseppe Bertero at Valparaiso, Chile, in October, 1819; V. lobata Meisn. is based on Miers 335, also from Valparaiso, deposited in the herbarium of the British Museum in London. The

Verbena dissecta of Morong is actually V. tenuisecta Briq., that of Schauer is V. berterii (Meisn.) Schau., and that of Willdenow is a valid species. The Lorentz & Niederlein reference given in the bibliography is sometimes erroneously dated "1889". The Loudon reference (1839) is sometimes accredited to W. Baxter, apparently in error.

Material of V. sulphurea has been misidentified and distributed in herbaria under the names V. berterii Schau., V. dissecta Spreng., V. erinoides Hook., V. erinoides Lam., V. multifida Ruíz & Pav., V. porrigens R. A. Phil., and Shuttleworthia dissecta Walp. On the other hand, the Skottsberg & Skottsberg 739, distributed as V. sulphurea, is the type collection of f. alba Moldenke, and 885 is the type collection of var. fuscorubra Skottsberg. Claude-Joseph 3547 is a mixture with var. taltalensis Moldenke, and Miers s.n. [Concan] is a mixture with V. berterii.

Verbena sulphurea apparently is very variable, is a mixture of several unrecognized taxa, or else the published descriptions are in part based on misidentifications. Skottsberg (1950) sums up the matter as follows: "El tubo corolar fué descrito como 'perfectly glabrous, both within and without'; de Candolle (Prodr. XI p. 551) dice 'corolla glabra', Gay (V p. 9) 'tubo glabro en el esterior', Reiche (V p. 290) 'tubo corolar pelado'. La figura 3 de Sweet muestra un tubo hirsuto por dentro como en nuestras plantas. Los pelos son de dos clases, moniliformes, esparcidos por el tubo más numerosos por arriba, y agujitas retrorsas y muy tupidas en la garganta (en este respecto la figura de Sweet es inexacta). Las indicaciones sobre el tamaño de los órganos florales varían bastante; en la ilustración citada la bráctea mide 7 mm, el cáliz 9.5, con dientes largamente mucronados, las divisiones mayores del limbo corolar 4 x 3 y los apéndices de los estambres superiores 1.5 mm. En la lámina de Lindley (Bot. Register XXI tab. 1148) las flores son algo mayores que en nuestra variedad fuscorubra. Gay indica un cáliz de 6—8 mm, 'un tanto mas largo que la brácteas', y la corola 'casi el doble más larga que el caliz'; según Reiche el cáliz mide 10—12 mm, las brácteas 3—4 mm ('un tercio del largo del cáliz'), y el tubo corolar 18—20 mm; según de Candolle el cáliz mide 7 y la corola 10—11 ('calycem dimidio superans')."

Goodspeed describes the "stamens" as black, but probably is referring to the anther-appendages only. Schauer (1847) says "Variat indumento magis minusve hirsuto hispidove, canescens et viridis." The canescent form is probably what Philippi refers to in his var. canescens, which see. Reiche speaks of the inflorescences becoming cylindric in age; possibly he refers here to what is now known as var. taltalensis Moldenke.

Schauer (1847) cites Bertero 1392 & 1809, Poeppig 157, Cuming 519, Gaudich s.n., Gay s.n., and Bridges s.n. from "In Chili arenosis sterilibus maritimis, ad Quintero et Valparaso, Concon, cet" as well as the Meyen s.n. from Peru. mentioned above, all deposited

in the Berlin and De Candolle herbaria, the former now destroyed. Hauman-Merck (1913) cites a Garbers s.n. [Hauman-Merck 348] from the plateau near Choele-Choel and Hier-Berg 124 from near Carmen de Patagones and San Blas, Río Negro, Argentina.

In all, 96 herbarium specimens, including type material of some of the names involved, and 3 mounted photographs have been examined by me.

Citations: CHILE: Aconcagua: Barros Valenzuela 8034 (N); Claude-Joseph 2516 (W—1189235); E. M. Kausel 2590 (N); Looser 5499 (N), 5503 (N); Rose & Rose 19395 (N, W—761925). Atacama: Morong 46 (C), 1126 (C), 1287 (C). Coquimbo: Barros Valenzuela 8037 (N); W. H. Harvey s.n. [Coquimbo, July—August 1856] (S); Looser 4217 (N), 4218 (N); Skottsberg & Skottsberg 789 (N), 843 (Go, N, S); Sparre 2680 (S). Malleco: Kunkel 166 (Cb). Santiago: Bücher, Hjerting, & Rahn 602 (S); Claude-Joseph 1725, in part (W-1121280). Valparaíso: K. Behn s.n. [29-VIII-1937] (N); Bertero 1392 (Du—166497, M, N—photo, S, Si—photo, Z—photo), 1809 (M), s.n. [Valparaiso] (Br); Bridges s.n. [Valparaiso] (Bm, Br, Br); Buchtien s.n. [Viña, 21/9/95] (S, W—1177976); Claude-Joseph 3547, in part (W—1281540), 3770 (W—1281647), 4991 (W—1422114); Collector undesignated 275 [314] (Mh); Garaventa 2438 [Herb. Looser 2024] (N); Goodspeed 4586 (Ca—561316); Looser 2084 (N, N), 3997 (N, N), 4024 (N); Miers 72x (W—1343927), 335 (Bm), s.n. [Concan] (Bm); Moldenke & Moldenke 19762 (Es, Lg, Mg, N, Ot, Sm), 19770 (B, Es, F, Fy, Hk, Hw, Le, Lg, Lm, Mg, Mr, N, No, Ok, Ot, Rs, S, Sm, Sm, Sa, Ss, Z); Morong 1332 (C); J. L. Morrison 16846 (Ca—629959, S); R. A. Philippi 1299 (W—1323131); Rose & Rose 19146 (N, W—761710); Wall & Sparre 5 (Ew); Werdermann 17 (Ca—238179, Gg—34515, S). Province undetermined: Bridges s.n. [Chile] (S); Claude-Joseph 2177 [Costa] (W—1189516); Cuming 450 (Br), s.n. [Chile, 1835] (Br); Herb. Sullivant s.n. [Chili] (Pa); Miers 511 [south of Chile] (Bm), 512 [south of Chile] (Bm); Petré s.n. (S). CULTIVATED: Belgium: M. Martens s.n. [h. b. Brux. 1848] (Br). Italy: Herb. Harvey s.n. [hort. Aurelian, 1843] (Du—166496). Switzerland: Herb. Hort. Basil. s.n. [Aug. 1841] (M).

VERBENA SULPHUREA f. ALBA Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 102 & 199, nom. nud. 1949; ex C. Skottsberg, Medd. Göt. Bot. Trädg. 18: 151. 1950.

Bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 102 & 199. 1949; Moldenke, Alph. List Cit. 3: 940. 1949; C. Skottsberg, Medd. Göt. Bot. Trädg. 18: 151. 1950; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 66. 1951; Moldenke, Résumé 122 & 474. 1959.

This form differs from the typical form of the species in having its corollas white or greenish-white. It is described as a

perennial herb, 10—15 cm. tall, with leaves pubescent, bractlets 4—5 mm. long, flowers very fragrant, calyx 8--8.5 mm. long, corolla-tube 10--11 mm. long, the lobes of its limb 4 mm. long and 3 mm. wide, anther-appendages black, about 2 mm. long, and style 10 mm. long.

The type of this form was collected by Carl Johan Frederik Skottsberg and Inga Skottsberg (no. 739) at Estancia Frai Jorge, at an altitude of 215 meters, Coquimbo, Chile, on August 13 or 14, 1917, and is deposited in the herbarium of the Botaniska Trädgarden at Göteborg. Worth & Morrison describe the "stamens" as black, but I assume that they are here referring to the anther-appendages only. The form has been found growing on steep brushy rocky slopes at altitudes of 215 to 1800 meters, flowering in August and November. Material has been distributed in herbaria under the designation "Verbena sulphurea Sweet".

In all, 4 herbarium specimens, including the type, and 2 mounted photographs have been examined by me.

Citations: CHILE: Coquimbo: Skottsberg & Skottsberg 739 (Go—type, N—isotype, N--photo of type, S--isotype, Z--photo of type); Worth & Morrison 16690 (Ca--633190).

VERBENA SULPHUREA var. CANESCENS R. A. Phil., Anal. Univ. Chil. 35: 190, in nota. 1870.

Bibliography: R. A. Phil., Anal. Univ. Chil. 35: 190. 1870; Moldenke, Résumé Suppl. 7: 5. 1963.

Nothing is known to me about this variety except that Philippi (1870) says "Se recojió una variedad 'canescens' de esta especie [Verbena sulphurea Sweet], que es una de las pocas que habitan en ambos lados de la cordillera." I assume that the name applies to the ashy-gray form of V. sulphurea referred to by me (above). More study is needed to determine if the gray and canescent forms of the species are worthy of nomenclatural separation.

VERBENA SULPHUREA var. FUSCORUBRA Skottsberg ex Moldenke, Alph. List Cit. 3: 940, hyponym. 1949; Medd. Göt. Bot. Trädg. 18: 151. 1950.

Bibliography: Moldenke, Alph. List Cit. 3: 940. Feb. 10. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 102 & 199. Sept. 28. 1949; C. Skottsberg, Medd. Göt. Bot. Trädg. 18: 151. 1950; Moldenke, Phytologia 3: 290. 1950; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 66. 1951; Moldenke, Résumé 122 & 474. 1959.

This variety differs from the typical form of the species in having dark-red corollas. Skottsberg states that it also differs from (his concept of) the typical form of the species in being more robust and less hirsute, in having the bractlets 6—7 mm. long, and in having larger flowers, the calyx 10 mm. long, its teeth 1.5—2.5 mm. long, subulate, the corolla-tube 11—14 mm. long, the lobes of the limb 5.5 mm. long and 3.5 mm. wide, the anther-appendages gray, 2—2.5 mm. long, and the style 10 mm. long.

The type of the variety was collected by Carl Johan Frederik

Skottsberg and Inga Skottsberg (no. 885) at Loma de Frai Jorge, Coquimbo, Chile, on August 19 ["August 19" according to the label, but September 19, according to the original description], 1917, and is deposited in the herbarium of the Botaniska Trädgard at Göteborg. It was originally identified as and distributed as "Verbena sulphurea Sweet". It has been found in anthesis from August to October.

In all, 3 herbarium specimens, including the type, and 2 mounted photographs have been examined by me.

Citations: CHILE: Coquimbo: Skottsberg & Skottsberg 885 (Go--type, N--photo of type, S--isotype, Z--photo of type). Ovalle: Barros Valenzuela 8031 (N).

VERBENA SULPHUREA var. INTERMEDIA Kuntze, Rev. Gen. Pl. 3 (2): 258 [as "sulfurea"]. 1898.

Synonymy: Verbena sulfurea f. intermedia Kuntze ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena sulphurea f. intermedia Kuntze ex Moldenke, Suppl. List Invalid Names 10. 1941. Verbena sulphurea intermedia Kuntze ex Moldenke, Résumé 376, in syn. 1959.

Bibliography: Kuntze, Rev. Gen. Pl. 3 (2): 258. 1898; Macloskie in W. B. Scott, Rep. Princeton Univ. Exped. Patag. 8 (2): 689. 1905; Moldenke, Suppl. List Invalid Names 10. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42, 44, & 102. 1942; Moldenke, Alph. List Cit. 1: 93 (1946), 2: 446 (1948), and 3: 748. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 102, 107, & 199. 1949; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 67. 1951; Moldenke, Résumé 122, 128, 376, & 474. 1959; Moldenke, Résumé Suppl. 7: 10. 1963; Moldenke, Phytologia 9: 397 (1964) and 11: 52. 1964.

This variety differs from the typical form of the species in having the corolla-tube to 15 mm. long, twice the length of the calyx.

The type of the variety was collected by Francisco Josué Pascasio Moreno and Tonini (no. 330) in Patagonia and is deposited in the Britton Herbarium at the New York Botanical Garden. The plant has been collected along roadsides and in quebradas, at altitudes of 1800 to 3200 meters, in anthesis from December to April and in October. Material has been misidentified and distributed in herbaria under the names V. laciniata (L.) Briq. and V. radicans Gill.

The plant is described as an herb with white flowers [Cuezzo & Barkley 20Mz538; Ruíz Leal 1284] or white, purple in the throat [Cuezzo & Barkley 20Mz378]. Kuntze says "Tubus corollae calyce duplo longior -- 1 1/2 cm longus.....Bei α normalis ist der Corollen-tubus kaum 1 cm. lang und überragt der Kelch nur wenig."

In all, 16 herbarium specimens, including the types of all the names involved, have been examined by me.

Citations: CHILE: Coquimbo: Herb. Mus. Nac. Santiago 12 (N).

ARGENTINA: Mendoza: Carette 339 (N); Cuezzo & Barkley 20Mz378 (N), 20Mz538 (N); Ruíz Leal 1284 (N), 3627 (N), 5130 (N), 7200 (Rl), 10697 (Z); Semper s.n. [Herb. Ruíz Leal 3419] (N), s.n. [Herb. Ruíz Leal 4258] (N), s.n. [Herb. Ruíz Leal 10563] (Rl), s.n. [Herb. Ruíz Leal 13078] (Rl). San Juan: Castellanos 15923 (W—2198348); F. A. Roig s.n. [Herb. Ruíz Leal 12995] (Rl); Semper s.n. [Herb. Ruíz Leal 13966] (Rl). Province undetermined: Moreno & Tonini 330 [Patagonia] (N—type).

VERBENA SULPHUREA var. LONGITUBA Kuntze, Rev. Gen. Pl. 3 (2): 258 [as "sulfurea"]. 1898.

Bibliography: Kuntze, Rev. Gen. Pl. 3 (2): 258. 1898; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42 & 102. 1942; Moldenke, Castanea 13: 118. 1948; Moldenke, Alph. List Cit. 2: 444 & 628 (1948) and 3: 672. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 102 & 199. 1949; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 70. 1951; Moldenke, Résumé 122 & 474. 1959; Moldenke, Résumé Suppl. 7: 5 & 10. 1963.

This variety differs from the typical form of the species in its elongate corollas, which are to 20 mm. long, almost 3 times the length of the calyx.

The type of this variety was collected by Carl Ernst Otto Kuntze at Paso Cruz, at an altitude of 2400 meters, O'Higgins, Chile, and is deposited in the Britton Herbarium at the New York Botanical Garden. The plant has also been found at 1000 meters altitude, flowering in October. The Stockholm specimen cited below shows very curious pubescence on the calyx. Material has been identified and distributed in herbaria as V. sulphurea D. Don.

In all, 3 herbarium specimens, including the type, have been examined by me.

Citations: CHILE: Aconcagua: Herb. Mus. Bot. Stockholm s.n. (S). Coquimbo: Looser 4216 (N). O'Higgins: Kuntze s.n. [Paso Cruz, 2400 m.] (N—type).

VERBENA SULPHUREA var. PEDUNCULATA C. Gay, Hist. Fis. Chile Bot. 5: 8. 1849.

Bibliography: C. Gay, Hist. Fis. Chile Bot. 5: 8. 1849; Reiche, Fl. Chile 5: 290. 1910; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 102 & 199. 1949; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 67. 1951; Moldenke, Résumé 122 & 474. 1959.

This variety differs from the typical form of the species in having its leaves larger, with more remote segments, and the peduncles longer, almost leafless, and nutant.

No type was designated for this variety by Gay, and I know nothing about it except what is said by him in his original Latin diagnosis. His Spanish description is apparently meant to include both the variety and the typical form of the species, of which he says "Planta algo comun en las provincias centrales y del norte Valparaiso, Quintero, Coquimbo, etc."

VERBENA SULPHUREA var. SCABRA Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 67—68. 1951.

Bibliography: Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 67—68. 1951; Biol. Abstr. 28: 904. 1954; Moldenke, Phytologia 5: 96. 1954; Moldenke, Résumé 122 & 474. 1959; Moldenke, Résumé Suppl. 7: 5. 1963.

This variety is said to differ from the typical form of the species in being scabrous and more robust, with short rigid hairs, long, denser and retrorse ones on the stem and midrib of the leaves, which are thicker and simple, the lower ones much larger. The original description actually reads as follows: "A type differt scabre robustioreque, pilis brevibus, regidisque, densioribus, longis, retrorsisque in caulo et nervio medio foliorum; haec crassioribus simplisibusque, inferiores multo majores sunt."

The type of the variety was gathered by an unknown collector at Huasco, Atacama, Chile, in September 1885, and is sheet no. 54741 in the herbarium of the Museo Nacional de Historia Natural at Santiago, Chile. The plant is known to me only from the original description.

VERBENA SULPHUREA var. TALTALENSIS Moldenke, Phytologia 3: 281. 1950.

Bibliography: Moldenke, Phytologia 3: 281 & 290. 1950; Moldenke, Résumé 122 & 474. 1959; Moldenke, Résumé Suppl. 6: 6. 1963.

This variety differs from the typical form of the species in having its inflorescences elongated and spicate, 4.5—10 cm. long, even during anthesis.

The type of this variety was collected by Ernesto Barros Valenzuela (no. 8032) at Taltal, Antofagasta, Chile, on September 26, 1940, and is deposited in the Britton Herbarium at the New York Botanical Garden. His no. 8033 was apparently collected at the same locality on the same day. Claude-Joseph 3547 seems to be a mixture of this variety and the typical form of the species.

In all, 3 herbarium specimens, including the type, have been examined by me.

Citations: CHILE: Antofagasta: Barros Valenzuela 8032 (N—type), 8033 (N). Valparaíso: Claude-Joseph 3547, in part (W—1281540).

VERBENA SUPINA L., Sp. Pl., ed. 1, 1: 21. 1753 [not V. supina Trag., 1552].

Synonymy: Peristereon hyppios Diosc., Med. Mat. 5: 496. 1529. Verbenaca supina Diosc., Med. Mat. 5: 496. 1529. Peristereona supinum Diosc., Med. Mat. 5: 496. 1529. Verbenaca supina Clus., Rar. Stirp. Hisp. Obser. Hist. 2: 372—373. 1576 [not Verbenaca supina Gesn., 1553, nor Ruel, 1551]. Sacra verbena hispanica minor L'Obel, Icon. Stirp. 535. 1591. Verbena supina clusii L'Obel, Icon. Stirp. index n.p. 1591. Verbena supina Clus., Rar. Plant. Hist. Stirp. 4: xlv & xlvi. 1601. Verbena tenuifolia C.

Bauhin, Pinax Theatr. Bot., ed. 1, 269. 1623. Verbenaca foemina Caesalp. ex C. Bauhin, Pinax Theatr. Bot., ed. 1, 269, in syn. 1623. Verbenaca supina (& foemina) Fuchs ex C. Bauhin, Pinax Theatr. Bot., ed. 1, 269, in syn. 1623. Verbenaca supina Fuchs apud Matth., Opera Omnia Comment. 741. 1624. Verbena foemina Caesalp. apud Matth., Opera Omnia Comment. 741. 1624. Verbenaca supina J. Bauhin, Hist. Plant. Univ. 3: 444. 1651. Verbenaca supina Matth., Apolog. 174. 1674. Verbenaca, supina, sive sacra herba Matth. apud J. Bauhin, Hist. Pl. Eur. 2: 494. 1689. Verbena tenuifolia supina flo. coerul. R. Morison, Pl. Hist. Univ. Oxon. 3: "408" [=418] & 419, sect. 11, pl. 25, fig. 7. 1699. Supina sive foemina Park. apud R. Morison, Pl. Hist. Univ. Oxon. 3: 419, in syn. 1699. Verbena; tenuifolia C. Bauhin apud Boerh., Ind. Alt. Plant. Hort. Acad. Lugd.-Bat., ed. 2, 1: 187. 1720. Verbena foliis decomposito-pinnatifidis, caule procumbente L., Hort. Cliff. 11. 1737. Verbena supina J. Bauhin apud L., Hort. Cliff. 11, in syn. 1737. Verbena foliis decomposito-pinnatifidis, caule diffuso L. apud A. van Royen, Fl. Leyd. Prod. 327. 1740. Verbenaca supina Cord. apud A. von Haller, Enum. Meth. Stirp. Helvet. 1: 661. 1742. Verbenaca supina s. femina Fuchs apud A. von Haller, Enum. Meth. Stirp. Helvet. 1: 661. 1742. Verbena foliis de composito-pinnatifidis caule diffuso L. apud Sauvages, Meth. Fol. Pl. Fl. Monspel. 248. 1751. Verbena procumbens Forsk., Fl. Aegypt.-arab. 10. 1775 [not V. procumbens Hayek, 1908]. Verbena radicans Moench, Meth. 369. 1794 [not V. radicans Gill. & Hook., 1829]. Verbena tetrandra; spicis filiformibus, solitariis; foliis bipinnatifidis L. apud Desf., Fl. Atlant. 1: 17, in syn. 1800. Verbenaca supina sive foemina Tabern. apud Desf., Fl. Atlant. 1: 17, in syn. 1800. Verbena spicis filiformibus, solitariis; foliis bipinnatifidis; caulibus ramosissimis, decumbentibus Lam. apud Poir. in Lam., Encycl. Méth. Bot. 8: 545, in syn. 1808. Verbena tetrandra, spicis filiformibus, solitariis; foliis bipinnatifidis L. apud Poir. in Lam., Encycl. Méth. Bot. 8: 545, in syn. 1808. Sacra verbena, hispanica, minor L'Obel apud Poir. in Lam., Encycl. Méth. Bot. 8: 545, in syn. 1808. Verbena supina, sive femina Tabern. apud Poir. in Lam., Encycl. Méth. Bot. 8: 545, in syn. 1808. Verbena tetrandra; spicis filiformibus solitariis; foliis bipinnatifidis Kniph. apud Picot de Lapeyr., Hist. Abrég. Pl. Pyrén. 13, in syn. 1813. Verbena supina β hirsuta Ehrenb. ex Sweet, Hort. Brit., ed. 2, 418. 1830. Verbena tetrandra, spicis filif. solitariis, fol. bipinnatifidis L. apud H. E. Richter, Cod. Bot. Linn. 36. 1835.

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520. 1551; Tragus, Stirp. Germ. 211. 1552; Gesner, Collect. Stirp. 113. 1553; Cordus, Op. Posth. 66. 1561; Clus., Rar. Stirp. Hisp. Obser. Hist. 2: 372—373. 1576; Dodon., Stirp. Hist. Pemptad., ed. 1, 150. 1583; Gesner, Stirp. Collect. 113. 1587; Tabern., Icon. Plant. 132. 1590; L'Obel, Icon. Stirp. 535 & index. 1591; Gerarde, Herbal 580—581. 1597; Gerarde, Hist. Plant. Emac. 718, fig. 2. 1597; Clus., Rar. Plant. Hist. Stirp. 4: xlv & xlvi. 1601; Dodon., Stirp. Hist. Pemptad., ed. 2, 150. 1616; C. Bauhin, Pinax Theatr. Bot., ed. 1, 269. 1623; Matth., Opera Omnia Comment. 741. 1624; J. Parkinson, Theat. Bot. 675. 1640; J. Bauhin, Hist. Plant. Univ., ed. 1, 3: 444. 1651; Matth., Apolog. 174. 1674; Matth., Comment. 393. 1680; P. Herm., Hort. Acad. Lugd.-Bat. Cat. 619. 1687; J. Bauhin, Hist. Pl. Eur. 2: 494. 1689; P. Herm., Fl. Lugd.-Bat. 55. 1690; R. Morison, Pl. Hist. Univ. Oxon. 3: "408" [=418] & 419, sect. 11, pl. 25, fig. 7. 1699; Tourn., Inst. Rei Herb. 200. 1700; Boerh., Ind. Plant. Hort. Acad. Lugd., ed. 1, 75. 1710; Boerh., Ind. Alt. Plant. Hort. Acad. Lugd., ed. 2, 1: 187 (1720) and ed. 3, 1: 187. 1727; L., Hort. Cliff. 11. 1737; A. van Royen, Fl. Leyd. Prod. 327. 1740; A. von Haller, Enum. Meth. Stirp. Helvet. 1: 551, 634, & 661. 1742; Sauvages, Meth. Fol. Pl. Fl. Monspel. 248. 1751; L., Sp. Pl., ed. 1, 1: 21. 1753; L., Syst. Nat., ed. 10, 852. 1759; Kniphof, Orig. Cent. 12: no. 99. 1764; Kniphof, Herb. Viv. 2: pl. 1157. 1764; P. Mill., Dict., ed. 8, Verbena no. 3. 1768; J. A. Murray in L., Syst. Veg., ed. 13, 62. 1774; Forsk., Fl. Aegypt.-arab. 10. 1775; Sabbat in Martelli, Hort. Roman. 3: 11. 1775; Christm. & Panzer, Vollst. Pflanzensyst. Houttuyn 5: 130. 1779; L'Hér., Stirp. Nov. 1: 22. 1786; Poir. in Lam., Encycl. Méth. Bot. [Illustr.] 1: 57. 1791; Moench, Meth. 369. 1794; Willd., Sp. Pl. 1: 120. 1797; C. Murr., Brit. Gard. 2: 479—480. 1799; Desf., Fl. Atlant. 1: 17. 1800; Lam. & DC., Fl. Franç. 3: 503. 1805; Poir. in Lam., Encycl. Méth. Bot. 8: 545—546. 1808; Dum. Cours., Bot. Cult., ed. 2, 2: 624. 1811; Picot de Lapeyr., Hist. Abrég. Pl. Pyrén. 12—13. 1813; J. Sm. in Rees, Cycl. 36: no. 23. 1817; Steud., Nom. Bot., ed. 1, 874. 1821; Spreng. in L., Syst. Veg., ed. 16, 2: 750. 1825; Sibthorp & Sm., Fl. Graec. 6: pl. 554. 1827; Sweet, Hort. Brit., ed. 2, 418. 1830; Host, Fl. Austr. 2: 180. 1831; H. E. Richter, Cod. Bot. Linn. 36. 1835; G. L. Petermann, Cod. Bot. Linn. Ind. Alph. 196. 1840; Sadl., Fl. Comit. Pest., ed. 2, 269. 1840; Steud., Nom. Bot., ed. 2, 2: 750. 1841; D. Dietr., Syn. Pl. 3: 605. 1843; Walp., Repert. 4: 25. 1845; Schau. in A. DC., Prodr. 11: 548. 1847; Schnitzlein, Iconogr. 2: pl. 137. 1856; Reichenb., Icon. Fl. Germ. 18: pl. 1292. 1857; Heuff., En. Pl. Ban. 146. 1858; Munby, Cat. Pl. Alg. 25. 1859; A. Irvine, Phytologist 1859: 342. 1859; Rupr., Fl. Ingrica 1: 563. 1860; Tornabene, Atti Accad. Gioenia di Sci. Nat. Catania, ser. 2, 16: 125. 1860; Neilr., Aufz. 170. 1866; Ascherson in G. Schweinf., Beitr. Fl. Aethiop. 1: 120. 1867; Benth. in Benth. & Hook. f., Gen. Pl. 2 (3): 1146. 1876; Loret & Barrandon, Fl. Montpel. 533. 1876; J. Ball, Journ. Linn. Soc. Lond. Bot. 16: 607. 1878; Pickering, Chron. Hist. Pl. 253 & 1220. 1879; Tristram, Surv. West. Palest., ed. 1, 378 (1884) and ed. 2, 378. 1888; Batt. & Trab., Fl. Alg. 1: 717. 1888; Briq. in

Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 148. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Baker & Stapf in Thiselt.-Dyer, Fl. Trop. Afr. 5: 286. 1900; Fiori & Paoletti, Icon. Fl. Ital. 2: 380, fig. 3219. 1902; J. M. Black, Nat. Fl. S. Australal. 127. 1909; Hayek, Pflanzend. Oesterr.-Ung. 1: 520. 1916; C. L. Pollard in Webster, New Internat. Dict. Eng. Lang. 2275. 1917; A. Chev., Explor. Bot. Afr. Occid. Franç. 1: 504. 1920; Murbeck, Acta Univ. Lund. [Lunds Univ. Årsskr.], new ser., 17 (1): 19. 1921; J. M. Black, Fl. South. Austr. 3: 478. 1926; Hegi, Illustr. Fl. Mittel-Eur. 5 (3): 2239. 1927; Stapf, Ind. Lond. 6: 431. 1931; Eig in Fedde, Repert. Beiheft 63: 153. 1931; Eig, Zohary, & Feinbrunn, Pl. Palest. 305—306. 1931; Javorka & Csapody, Ic. Fl. Hungar. 418. 1932; C. I. Sandwith, Rep. Bot. Exch. Club Brit. Isles 10: 348. 1933; Post, Fl. Syria, ed. 2, 2: 322 & 925. 1933; Sherff, Field Mus. Publ. Bot. 16: 269 & 278. 1937; Monod, Phanerogames in Contrib. Etude Sahara Occident. 2: pl. 22. 1939; Moldenke, Prelim. Alph. List Invalid Names 49. 1940; Worsdell, Ind. Lond. Suppl. 2: 486. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 5, 44, 45, 53, & 102. 1942; Moldenke, Alph. List Invalid Names 51. 1942; Rozeira, Fl. Prov. Tras. 164. 1944; Moldenke, Phytologia 2: 339, 342, & 348. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 27. 1947; Moldenke, Castanea 13: 121. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 19 & 43. 1948; Moldenke, Alph. List Cit. 2: 356, 357, 414, 443, 481, 513, 535, 580, 585, 600, 619, 620, 624, 632, 640, & 644 (1948), 3: 657, 702, 726, 816, 838, 842, 880, 916, 924, & 934 (1949), and 4: 983, 986, 998, 1126, 1167, 1173, 1179, 1180, 1201, 1208, 1213, 1218, 1222, 1233, 1241, & 1291. 1949; Moldenke, Phytologia 3: 139. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 11, 107—110, 124, 125, 165, & 199. 1949; Moldenke, Phytologia 3: 291. 1950; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; Monod, Bull. Inst. Franç. Afr. Noir 14: 433 (1952) and 16: 28 & 41. 1954; Moldenke, Phytologia 5: 63. 1954; Monod, Not. Bot. & Iter. Comment. Occ. VIII Cong. Internat. Bot. 28. 1954; Moldenke, Am. Midl. Nat. 59: 341 & 342. 1958; Moldenke, Résumé 14, 129—134, 158, 159, 224, 372, 378, 426, 427, & 474. 1959; Moldenke, Résumé Suppl. 1: 8 & 11 (1959) and 2: 12 & 13. 1960; Moldenke, Phytologia 8: 120, 145, & 146. 1961; Moldenke, Résumé Suppl. 3: 27 (1962), 4: 10, 12, 15, & 19—21 (1962), and 5: 8. 1962; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 788. 1962; Zohary, Pl. Life Palest. 164. 1962; Moldenke, Résumé Suppl. 7: 6 & 8. 1963; Moldenke, Phytologia 8: 472 (1963), 9: 38, 198, 285, 286, 305, & 315 (1963), 10: 210, 212, 217, & 282 (1964), and 11: 51. 1964.

Illustrations: Clus., Rar. Stirp. Hisp. Obser. Hist. 2: 373. 1576; Dodon., Stirp. Hist. Pemptad. 150. 1583; Tabern., Icon. Plant. 132. 1590; L'Obel, Icon. Stirp. 535. 1591; Gerarde, Herbal 580, fig. 2. 1597; Gerarde, Hist. Plant. Emac. 718, fig. 2. 1597; Clus., Rar. Plant. Hist. Stirp. 4: xlvi. 1601; J. Parkinson, Theat. Bot. 675. 1640; J. Bauhin, Hist. Plant. Univ., ed. 1, 3: 444. 1651; J. Bauhin, Hist. Pl. Eur. 2: 494. 1689; R. Morison, Pl. Hist. Univ. Oxon. 3: sect. 11, pl. 25, fig. 7. 1699; Kniphof,

Orig. Cent. 12: no. 99 [in color]. 1764; Kniphof, Herb. Viv. 2: pl. 1157 [in color]. 1764; Sibth. & Sm., Fl. Graec. 6: pl. 554 [in color]. 1827; Schnitzlein, Iconogr. 2: pl. 137 [in color]. 1856; Reichenb., Icon. Fl. Germ. 18: pl. 1292 [in color]. 1857; Fiori & Paoletti, Icon. Fl. Ital. 2: fig. 3219. 1902; J. M. Black, Nat. Fl. S. Austral. 127. 1909; Hayek, Pflanzend. Oesterr.-Ung. 1: 520. 1916; Murdock, Acta Univ. Lund. [Lunds Univ. Årsskr.], new ser., 17 (1): 19. 1921; Javorka & Csapody, Ic. Fl. Hungar. 418. 1932; Monod, Phanerogames in Contrib. Etude Sahara Occident. 2: pl. 22. 1939.

Low annual herb, usually densely pubescent throughout, sometimes almost glabrescent and shiny; stems usually procumbent and much branched from the base, subterete or subcompressed, more or less pubescent or subpubescent; branches mostly procumbent, strigose-hispid and more or less canescent, the tips often ascending or even erect; leaves decussate-opposite, varying from many-parted or pinnatifid to pinnatisect or bipinnatifid, deltoid in outline, cuneate at the base and decurrent into the petiole, the segments oblong, rather obtuse at the apex, dentate-incised or trifid, usually hispidulous on both surfaces, the venation impressed above, the margins revolute; inflorescence terminal, spicate, simple; spikes solitary, slender or filiform, at first short and dense, often elongating to 15 cm. in fruit; peduncles hairy; bractlets ciliate, usually about half as long as the calyx or sometimes more elongate, the lower ones lanceolate and equaling the calyx; calyx about 2 mm. long, strigose-canescent; corolla hypocrateriform, tiny, varying from blue or bluish to pale purplish-blue or lilac, its tube 3--4 mm. long, usually twice as long as the calyx, the limb 1--2 mm. wide; stamens 4; schizocarp obovoid-tetragonal, as long as the calyx or included by the fruiting-calyx; cocci obtusely carinate on the back, coarsely and transversely rugose toward the apex.

There is some question about the typification of this species. The original specimen of Linnaeus, preserved as sheet G.834, S.7, in the Linnean Herbarium at London, was collected by him in the George Clifford garden in England and shows erect stems and thus does not agree well with his description of either 1737 or 1753. In the Stockholm herbarium, however, there is a specimen of Loefling 16 which, in my opinion, should be regarded as the type. On the obverse side of the sheet there is written "VERBENA" in ink, and then near the bottom in pencil "cfr. Verbena 14 Supina L. sp. pl. 21", and then at the very bottom in ink in Linnaeus' own handwriting "14 supina". On the reverse side of the sheet there is written in pencil "Linné herb" and in ink "Verbena tetrandra, spicis filiformibus solitariis, foliis pinnatifidis Linn. Spec. plant. 21.14" and in ink in Linnaeus' own handwriting "Hispania 16 Loefl." The specimen is apparently of the supine form and thus agrees with the description of Linnaeus in 1753: "14. VERBENA tetrandra, spicis filiformibus solitariis, foliis bipinnatifidis. Verbena tenuifolia. Bauh. pin. 269. Verbena supina. Clus. hist. 2. p. 46. Habitat in Hispania." Cufodontis (1962)

cites the type of the species as "ex Hispania".

Walpers (1845) classifies V. supina in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Micranthae, and Secondary Subgroup Schizophyllae, with 9 other species. The specific name is sometimes uppercased, for no valid reason.

Verbena supina has been collected in dry as well as moist places, lowlands and arid deserts, parklands and plains, and on seaport ballast, at altitudes from sealevel to 90 meters, flowering in March and from May to September, fruiting in March, August, and September. It is native to the Mediterranean region and the Near East, introduced elsewhere. Baker & Stapf (1900) say of it "spread through the Mediterranean region"; Bentham (1876) says "orbi veteri propria, regionis Mediterraneae ab ins. Canariensibus usque ad Orientem incola." Eig, Zohary, & Feinbrunn (1931) report that in Palestine it inhabits moist places and lowlands, flowering from May to August; Zohary (1962) notes that it forms a part of the Crypsidetum minuartioidis ecologic association in that country. Mohr says that in 1893 it was a "common ballast weed" at Mobile, Alabama, while Black (1926) states that it is common on parklands and plains near Adelaide, South Australia. Douglas H. Kent, in a letter to me dated November 28, 1949, reports that it is adventive in England, and this statement is borne out by the reference in the bibliography given above and in specimens cited below. It has apparently existed in cultivation in England since 1799.

It should be noted here that the Verbena supina of Tragus is actually Bidens tripartita L. in the Carduaceae, the V. femina of Brunfels is Erysimum officinale L. in the Brassicaceae, the V. procumbens of Hayek is V. hayekii Moldenke, and the Verbenaca supina of Ruel and of Gesner is a mint. C. Bauhin (1623) places Verbenaca foemina Caesalp. and Verbenaca supina (& foemina) Fuchs in the synonymy of his Verbena communis caeruleo flore (which is what we now call Verbena officinalis), but I place them in the synonymy of Verbena supina.

It should perhaps also be mentioned here that the L., Sp. Pl. (1753) reference is often erroneously cited to page "29"; the Clusius [=L'Ecluse] reference (1601) is often given as "2: 46" or "2: 45—46, fig. 1"; and the J. Bauhin (1651) reference in the bibliography above is sometimes misdated "1650" or "1750". The publication by John Ball (1878) is often cited as "Ball, Spic."

Common names recorded for this species are "carpet vervain", "eysenkraut", "hairy vervain", "trailing Spanish vervain", "trailing vervain", "verminacola berbenaca", "vervaine femelle", and "verveine couchée".

Material of this species has been misidentified and distributed in herbaria under the names V. canescens H.B.K., V. forskaelei Vahl, V. forskålei Vahl, V. gracilis Desf., V. spuria L., and Priva dentata Pers. On the other hand, the Field & Lazar 190 (in part), Murbeck s.n. [Dar Farik, 17/5/1896], and Ruhmer s.n. [Ben-

ghasi, 22/12/1882], distributed as V. supina, seem to be f. erecta Moldenke; C. B. Clarke 2018 is V. officinalis L.; Pappi 2981 is V. officinalis var. prostrata Gren. & Godr.; Eyles 4349 is V. wrightii A. Gray; G. Jermy s.n. [Ttara, 1853] is Heliotropium procumbens Mill. in the Heliotropiaceae; and Pitard 468 (at least insofar as the University of California at Los Angeles specimen is concerned) is Teucrium campanulatum L. in the Lamiaceae. The Kulikowski 858, cited below, may possibly represent f. erecta; Kneucker 266 is extremely white-hairy and may be taken as representing Ehrenberg's variety hirsuta. The Lund specimen of Sintenis 1045 approaches f. erecta, but the branches are too diffuse and the stems too hairy. Grossheim s.n. [26.IX.25] is a mixture with Phyla nodiflora (L.) Greene.

Schauer (1847) cites Tenore s.n. from Italy, Duby s.n. from Sicily, Sibthorpe s.n. and Fraas s.n. from Greece, Fenzl s.n. from along the river Danube in Hungary, Steven s.n. from the Caucasus, Kotschy 447 from Mesopotamia, Klotsch 323 from Nubia, Acerbi s.n., Coquebert de Montbret s.n., Aucher-Eloy s.n., Martins s.n., and Wiest 90 from Egypt, Desfontaines s.n. from Algeria, Boissier s.n. from Spain, and Broussonet & Chr. Smith s.n. from the Canary Islands, all deposited in the Berlin and DeCandolle herbaria.

Irvine (1859) records the species from Wandsworth, Surrey, England. Ascherson (1867) cites Cienkowsky s.n. [Seru, Fesoghlu, 7 März 1848] and Ehrenberg s.n. [Chandek & Dar-Mahas, Nubia]. Baker & Stapf (1900) cite Ehrenberg s.n. [Nubia], Schweinfurth 878, Pfund 180, Fazokl s.n., Cienkowsky s.n., and Kotschy 265 from the Nile area; Chevalier (1920) records the species from Mauritania, citing Lt. G. Schmitt 28548. C. I. Sandwith (1933) cited an unnumbered collection from Baptist Mills, Bristol, England; Rozeira (1944) cites Ferreira s.n. [Bragança] and s.n. [Murça], Sampaio s.n. [Vimioso], s.n. [Mirando-do-Douro], s.n. [Genízio], and s.n. [Foz-Tua], M. Lopes s.n., Maria s.n., and Rozeira s.n. from Portugal; and Monod (1952, 1954) cites his nos. 280 [217], 9014, and 908516 from Mauritania. Boucher cites Forskål 2475.

In all, 144 herbarium specimens, including the type, and 7 mounted photographs have been examined by me.

Citations: ALABAMA: Mobile Co.: C. T. Mohr s.n. [Hunter's Wharf, Sept. 5, 1892] (W--771870, W--771872), s.n. [Mobile, July 1893] (C). GREAT BRITAIN: England: Lousley s.n. [Sharpness Docks, 1 Juli 1957] (Z). PORTUGAL: Ferreira s.n. [Julho 1880] (S); Mendes Pinheiro 1493a (Br); Rainha 2419 (W--2189948). SPAIN: Alstroemer s.n. (S); Bourgeau 2463 (Du, N); Collector undesignated s.n. [in Hispania] (S); Herb. Mus. Bot. Stockholm s.n. (S); J. Lange s.n. [17 Jul. 1851-52] (S), s.n. [July 1852] (Du); Loefling 16 [Herb.

Linnaeus G.35, S.16] (E--photo of type, F--photo of type, Ls--isotype, N--photo of isotype, N--photo of type, S--type, Sg--photo of type, Z--photo of type), s.n. (S); E. Reverchon 81 (Pa); Sennen & Mauricio 7657 (Ba); Vahl s.n. (S). CZECHOSLOVAKIA: Lejeune s.n. (Br). HUNGARY: Borbás 934 (B, B, Go, S, W--811335); Bornmüller 1502 (B); Boros 5 (S), s.n. [30 Jul. 1933] (Ew, Gg--267621); Collector undesignated s.n. (Sg--16111); Herb. Bormüller s.n. (B); Herb. Dörfler s.n. [1 Septembri 1884] (S); Janka 1853 (Ca--91015, Du, Du), s.n. [26 Septembr. 1860] (Gg--31452); G. Jermy s.n. (Ur--32001, W--315852); Korenl s.n. [26 Julio 1877] (Go); Kovács 460, in part (Ba, Br, Gg--163265, Go, S, Ur, W--1346993); Lengyel s.n. [23.VIII.1914] (B); Rácz s.n. [7.VIII.1911] (Go, S, Um--61); Tauscher s.n. [2 Julio 1878] (Go). GREECE: Heldreich 99 (S), s.n. [31 Jul. 1852] (S); Marie & Petitmengin 375 (La). ITALY: Herb. Martius s.n. [Palermo] (Br); Heuffel s.n. (Br). SICILY: Todaro 396 (Du, La, S), s.n. [1850] (S), s.n. (S). CRETE: Duffour 1507 (B, Vi). JUGOSLAVIA: Serbia: Sintenis 1669 (Lu). UNION OF SOCIALIST SOVIET REPUBLICS: Azerbaijan: Grossheim s.n. [26.IX.25] (B). Donetz: Gorschkowa 184 (S). Stalingrad: Becker s.n. [Sarepta] (Du). Ukrainia: Kulikowski 858 (Go, S). MOROCCO: Herb. Harvey s.n. [Tétuan, 1845] (Du--166468); Jahandiez 240 (Cp), 976 [Herb. Lacaitu 27915] (B, Bm); Lepiney, Rungs, & Sauvage 2503 (S); Sennen & Mauricio 8866 (Um--44). ALGERIA: Bové s.n. [Septembre 1839] (Du--166467); L. Chevalier 81 (Du); Cosson s.n. [29 Juill. 1854] (S), s.n. [20 Mai 1856] (Go); O. Debeaux s.n. [Pran, 28 avril 1883] (Br, Du), s.n. [1883] (Br); Jamin 3503 (Um--63); Le Cesve s.n. [7/6/1934] (Gg--223437); Munby s.n. [circa lacum Halsula] (W--147591); Reboud 2209 (Du). TUNISIA: Doumet-Adanson & Bonnet s.n. [29 avril 1884] (Br); Kralik 321 (Du); Pitard-Briau 468 (Go, Vt), s.n. [Gabès] (Vt). CYRENAICA: Ruhmer 262 (Br). EGYPT: Aucher-Eloy 2700 (Du--166450); Boucher 363 (Du--166500); C. G. Ehrenberg s.n. [IV. Cahiro] (S); A. Gray s.n. [Egypt & Nubia, 1869] (T); F. E. Hubbard s.n. [Feb. 24, 1868] (W--71956); Kneucker 266 (B); Kotschy s.n. [Blue Nile] (T); Kralik 13479 (Vi--126), s.n. [22/3/47] (Bm), s.n. [20 fév. 1848] (S), s.n. [Matarich, Cairo, Mart.] (W--147590); Letourneux s.n. [April 1876] (I); Samaritani s.n. (S); Schweinfurth s.n. [Cairo, 1880] (W--806208), s.n. [10 Juni 1887] (Br); Sieber 2 (Lu), s.n. [Beniseuf] (Bm, Vt); Täckholm s.n. [Luxor, 23/1/1927] (Ka); A. Wiest 90 [Herb. Prager 18642] (Du, Gg--31454). SUDAN: Nubia: Kotschy 323 (Du--166451, Lu, S). ARABIA: Yemen: Herb. Mus. Bot. Lund. s.n. [Arabia felix] (Lu). TURKEY: Ascherson 1045 (Br); Sintenis 1045 (Lu, S). ISRAEL: Jouannet-Marie 671 (Du). LEBANON: Gombault 4008 (S). JORDAN: Field & Lazar 190, in part (Du--235839).

SYRIA: Herb. U. S. Dept. Agr. s.n. (W—71957); Post 48 (W—805057). PAKISTAN: Sind: Kotschy 515 (S). MALAYA: Malacca: Collector undesignated s.n. [circa Malaccam] (Lu). CULTIVATED: Belgium: Lejeune s.n. (Br). England: Linnaeus s.n. [Hort. Cliff G. 834, S.7; Bailey Hort. neg. 6408] (N—photo). France: Herb. Decaisne s.n. [h. P. 1822] (Br). Germany: Herb. Calif. Acad. Sci. 31453 (Gg); Herb. Prager 18637 (Gg—31455). Italy: Herb. Harvey s.n. [h. R. P. 1819] (Du—166466). LOCALITY OF COLLECTION UNDETERMINED: Boisduval s.n. (W—71989); Collector undesignated 77 (Q); Hazslinszky s.n. [Kisupszallas] (W—71958); Herb. Alm. s.n. (S); Herb. Harvey s.n. (Du—166501); Herb. Mus. Bot. Stockholm s.n. [21/8] (S); Herb. Mus. Paris. s.n. (Ca—983626); Herb. Osbeck 2 (S); Mauricio s.n. [Melilla, VIII.1939] (Vi); Osbeck s.n. (S,S).

VERBENA SUPINA f. ERECTA Moldenke, Phytologia 2: 339, 340, & 342, nom. nud. (1947), f. nov.

Synonymy: Verbena supina var. major Foumerque ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947. Verbena supina var. glabra Lojac. ex Moldenke, Résumé 376, in syn. 1959. Verbena supina var. erecta Bég. ex Moldenke, Résumé 376, in syn. 1959. Verbena supina f. erecta Sennen & Mauricio ex Moldenke, Résumé Suppl. 1: 23, in syn. 1959. Verbena supina var. subglabriuscula Lindberg ex Moldenke, Résumé Suppl. 7: 10, in syn. 1963.

Bibliography: Moldenke, Phytologia 2: 339, 340, & 342. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 27. 1947; Moldenke, Alph. List Cit. 2: 619 (1948), 3: 849, 934, & 940 (1949), and 4: 1082, 1137, 1167, 1168, 1180, 1224, & 1292. 1949; Moldenke, Phytologia 3: 136 & 138. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 108—110, 124, & 199. 1949; Moldenke, Résumé 130, 132—134, 158, 376, 426, 427, & 474. 1959; Moldenke, Résumé Suppl. 1: 8, 11, & 23 (1959), 2: 5 & 6 (1960), and 7: 10. 1963.

Haec forma a forma typica caulis erectis recedit.

This form differs from the typical form of the species in having its stems usually erect or suberect.

The type of this form was collected by Elisée Reverchon (no. 81) in waste places at Algeciras in southwestern Spain on June 24, 1887, and is deposited in the herbarium of the Botaniska Trädgarden at Götteborg, Sweden. Actually, one or more of the trinomial names listed above in the synonymy may have priority over the name here adopted, but I have not as yet been able to find any earlier valid publication for any of them. It seems that the f. erecta of Sennen & Mauricio is based on their no. 8500 from Morocco, while var. subglabriuscula is based on H. Lindberg 489 from Spain.

Material of this form has been collected in flower and fruit in June. Herbarium material has been widely distributed as V. supina L. More study is needed to determine the actual taxonomic status of this form, which seems at times to intergrade with the typical form

or perhaps to hybridize with it. Material of Rainha 785, Sennen & Mauricio 7657, Kovács 460, Balansa 193, Kralik 321, Letiurneux s. n., Täckholm s.n., A. Wiest 90, Kotschy 323, Ascherson 1045, and Field & Lazar 1045, cited by me under V. supina, may, upon re-examination, prove to represent f. erecta instead.

In all, 65 herbarium specimens, including type material of all the names involved, and 2 mounted photographs have been examined by me.

Citations: PORTUGAL: Rainha 785 [Herb. Estac. Agron. Nac. 19870] (Mv, S). SPAIN: H. Lindberg 489 (B, Lu); E. Reverchon 81 (Br—isotype, Go—type, N—photo of type, S—isotype, Z—photo of type); Rigo 408 (B); M. Winkler s.n. [21 April 1873] (Br). HUNGARY: Heuffel s.n. (Pa); Kovács 460, in part (Ca—253693, Mv, Z). ITALY: Gavioli s.n. [VII.1938] (N). UNION OF SOCIALIST SOVIET REPUBLICS: Azerbaijan: Grossheim s.n. [V.1930] (S). MOROCCO: Quer 544 (B, Ca—484875, S); Sennen & Mauricio 7657 (Um—46), 8500 (Um—45); C. Skottsberg s.n. [2/6/1936] (Go), s.n. [6/4/1936] (Go); Uggla s.n. [2/4/1936] (S); E. Wall 5, in part [3/536] (S, S). ALGERIA: Balansa 193 (S, Vi—127); Bové 124 (Br); L. Chevalier 81a (Ob—6730), 81 bis (W—550297, W—1178267); Collector undesignated 257 (B); G. L. Durand 129 (Um—64); A. Faure s.n. [5 Mai 1911] (Ca—317427, N, S); Foumerque s.n. [13/6/89] (Du); LeCesve 7557 (B). TUNISIA: Herb. Lemmon s.n. (Ca—330212); Kralik 321 (B, S); Murbeck s.n. [Dar Farik, 17/5/1896] (Lu, S). CYRENAICA: Ruhmer s. n. [Benghasi, 22/12/1882] (Lu); Vaccari 183 (Go). EGYPT: Letourneux s.n. [April 1876] (S); Samaritani s.n. [27 April 1856] (S); Sickenberger s.n. [3 avril 1879] (Du); Sieber Fl. Mixta s.n. [Damiate] (M); Täckholm s.n. [23/1/1927] (S); A. Wiest 90 (M, S). SUDAN: Nubia: Kotschy 323 (Br). TURKEY: Ascherson 1045 (Du). JORDAN: Field & Lazar 190 (Ca—620379, N, N, S, W—1628833). IRAQ: Ahmed s.n. [Bakhtari, 24.2.47] (W—2272695); Bornmüller 1653 (B); Field & Lazar 530 (N). LOCALITY OF COLLECTION UNDETERMINED: Baker s.n. [Fl. Parept.] (Br); Herb. Mus. Bot. Stockholm s.n. (S); Sieber s.n. (Du—15818).

VERBENA SUPINA var. MINOR Post, Fl. Syria, ed. 2, 2: 322 & 925. 1933.

Bibliography: Post, Fl. Syria, ed. 2, 2: 322 & 925. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 124 & 199. 1949; Moldenke, Résumé 158 & 474. 1959.

This variety is said to differ from the typical form of the species in having its leaves less dissected and the spikes only 2—5 cm. long.

Post, in the reference cited above, infers that he originally published this trinomial in 1896, but, if so, I have not as yet

been able to find the reference. It does not seem to be included in his bibliography. Therefore it seems probable that the only specimen which he cites in 1933 is also the type of the variety -- apparently collected by himself at Akar-Dagh, in the "district from Tripoli as far as Mar'ash", Lebanon, and deposited in the Post Herbarium.

VERBENA SWIFTIANA Moldenke, Phytologia 2: 427--428. 1948.

Bibliography: Moldenke, Phytologia 2: 427--428. 1948; Moldenke, Castanea 13: 119. 1948; Moldenke, Alph. List Cit. 3: 916 (1949) and 4: 1257. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 107. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 128 & 474. 1959.

Low slender herb, 15--30 cm. tall; stems slender, often partly procumbent and rooting at the nodes, acutely tetragonal, glabrous, brunnescent; branches numerous, often simple or nearly so, erect, very slender, acutely tetragonal, brunnescent, glabrous; nodes annulate; principal internodes 1--2 cm. long; leaves decussate-opposite, numerous; petioles very slender, 1--3 mm. long, glabrous, or obscure and winged, merging into the blades; leaf-blades membranous, uniformly brunnescent on both surfaces, 1--2 cm. long, varying from linear or very narrowly elliptic and entire to ovate and trifid with the large terminal lobe entire or several-toothed or -incised, glabrous on both surfaces; midrib very tenuous, mostly indiscernible above, very slightly prominulous beneath; secondaries and veinlets indiscernible on both surfaces; inflorescence terminal, spicate, rather few-flowered, to about 5 cm. long, the flowers rather distant during and after anthesis; peduncles slender, exactly similar to the branches in color and texture, 1--1.5 cm. long; rachis exactly similar to the peduncle; bractlets lanceolate, about 1 mm. long and 0.5 mm. wide, acuminate at the apex, lightly strigillose; calyx tubular, about 1.5 mm. long and 0.75 mm. wide, lightly strigillose outside, the rim very shortly toothed; corolla hypocrateriform, pink or rose, its tube very slender, about 3 mm. long, very sparsely and minutely strigillose toward the apex, the limb about 3 mm. wide, very lightly and minutely strigillose toward the base outside.

The type of this species was collected by Gerardo Juan Schwarz (no. 3402) at Corpus, dept. San Ignacio, Misiones, Argentina, on September 19, 1946, and is deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm. The species is named in honor of Josiah Otis Swift (1870--1948), well-known naturalist, founder of the Yosian Brotherhood which in the past half century has brought the beauties of the great out-of-doors to over 200,000 Americans, chiefly in the vicinity of New York City. He was author of the daily column "News Outside the Door" which popularized Nature Study among millions of newspaper readers.

The species has been collected on river shores, flowering in September and November, fruiting in November. In all, 12 herbarium specimens, including the type, have been examined by me.

Citations: ARGENTINA: Misiones: Ekman 2019 (Mi, N, N, S), 2020

(Mi, N, N, S); G. J. Schwarz 3402 (F--photo of type, Gg--isotype, N--isotype, N--photo of type, S--type, S--isotype, Si--photo of type, Sw--photo of type, Z--photo of type).

VERBENA TAMPENSIS Nash, Bull. Torrey Bot. Club 23: 104. 1896.

Synonymy: Glandularia tampensis (Nash) Small, Man. 1139 & 1508. 1933. Verbena tampeusis Nash ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947. Grandularia tampensis (Nash) Small ex Moldenke, Résumé 297, in syn. 1959.

Bibliography: Nash, Bull. Torrey Bot. Club 23: 104. 1896; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 191. 1904; Moldenke, List Spec. Mold. Southeast. Set 10. 1930; Perry, Ann. Mo. Bot. Gard. 20: 243, 248, 250, 311, 321--322, & 356. 1933; J. K. Small, Man. 1139 & 1508. 1933; A. W. Hill, Ind. Kew. Suppl. 9: 124. 1938; Moldenke, Annot. & Classif. List 109. 1939; Moldenke, Prelim. Alph. List Invalid Names 26. 1940; Moldenke, Addisonia 21: 59. 1942; Moldenke, Alph. List Invalid Names 21. 1942; Schnack & Covas, Darwiniana 6: 476. 1944; Moldenke, Am. Midl. Nat. 32: 576. 1945; Moldenke, Castanea 10: 37. 1945; Moldenke, Alph. List Cit. 1: 72, 139, 140, 152, 197, 213, 278, 291, 292, 294, 295, 505, 508, 510, & 512. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 27. 1947; Moldenke, Castanea 13: 111. 1948; Moldenke, Am. Wild Fls. 292 & 450. 1949; Moldenke, Alph. List Cit. 3: 721, 741, 742, 760, 786, 800, 851, 852, 941--943, & 946 (1949) and 4: 1003, 1112, 1177, 1192, 1210, 1216, 1218, 1227, & 1253. 1949; Moldenke, Résumé 14, 296, 297, 376, & 474. 1959; Moldenke, Résumé Suppl. 3: 3. 1962; Moldenke, Phytologia 8: 435, 437, & 439 (1962), 9: 194 (1963), and 10: 124 & 125. 1964.

An herb, varying from decumbent or procumbent to erect, glabrous or pubescent with short appressed hairs; stems and branches erect or ascending from a decumbent and often creeping base, 2--6 dm. long, usually more or less branched, usually minutely pubescent, sometimes glabrate; leaves decussate-opposite; petioles 0.5--2.5 cm. long; leaf-blades oval or ovate to oblong-ovate, lanceolate, or elliptic, paler beneath, 2--8 cm. long, 1.5--4 cm. wide, acute at the apex, truncate at the base, cuneately narrowed into the margined petiole, coarsely and irregularly serrate, serrate-dentate, or crenate-dentate to shallowly incised or incised-serrate, entire on the basal cuneation, strigillose or glabrate on both surfaces; spikes pedunculate, 2--10 cm. long, capitate when young, fascicle-like in anthesis, becoming cylindric-elongate in age and often interrupted below in fruit; bractlets subulate or linear-subulate, strigillose, ciliate, about half as long as the calyx; calyx 12--15 mm. long, strigillose, the longer teeth setaceous-subulate, 2--4 mm. long; corolla hypocrateriform, varying from blue to purple or rose-purple, its tube about 1.5 cm. long or surpassing the calyx by 2--4 mm., pubescent on the outer surface and in the throat, the limb 10--12 mm. wide, the lobes obovate, emarginate at the apex; anthers without a gland or with a very small one on the connective of each of the upper pair of stamens; fruiting-calyx 12--13 mm. long, strigillose, the lobes

very slender, unequal, subulate; mature schizocarp slightly constricted along the lines of cleavage; cocci cylindric or subcylindric, about 4 mm. long, with a broadened base, furrowed or striate toward the base and areolate or reticulate-scrobiculate toward the apex or coarsely pitted from the middle to the apex, the commissural surface minutely scabrous.

The type of this species was collected by George Valentine Nash (no. 2470) just back of the beach line at Ballast Point, near Tampa, Hillsborough County, Florida. The collector notes that "in general appearance this plant has some resemblance to V. Aubletia, but a critical examination will readily show the differences. The entire absence of the gland on the anther connective, a character of the section in which V. Aubletia is placed, at once makes manifest its dissimilarity to that species."

The species has been collected on riverbanks and weedy sandy flats, at the borders of hammocks, along roadsides, and in dry sandy soil, muck soil, cypress swamps, low open woods, pinelands, hammocks, and wet or high hammocks, flowering and fruiting from February to June, and in September and December. The specific name is sometimes uppercased. Deam found "a large colony in cypress swamp". Nebb comments "anther tips small or wanting". Curtiss 1963 is a mixture -- the part [1963*] from "sandy ridges bordering the ocean, eastern Florida" is V. maritima Small; the part [1963**] from "roadsides near Charleston" is V. bonariensis L.; and the part from "low open woods, Indian River, June" is V. tampensis Nash.

Material of V. tampensis has been misidentified and distributed in herbaria under the names V. aubletia L., V. canadensis (L.) Britton, V. lambertii Sims, V. maritima Small, and Glandularia maritima (Small) Small. On the other hand, the Curtiss 5706, A. A. Eaton 546, W. H. Rhoades 6, and E. West s.n. [Chattahoochee, 8 Sept. 1931], distributed as V. tampensis, are all V. maritima Small. The Collector undesignated s.n. specimen in the University of Vermont herbarium is a mixture with Stylodon carneus (Medic.) Moldenke.

Perry (1933) cites the following 14 additional specimens not as yet seen by me: FLORIDA: Brevard Co.: Curtiss 1963, in part [low open woods, Indian River, June] (E, G, W); Fredholm 5804 (G). Broward Co.: J. P. Young 737 (W). Dade Co.: Edw. Palmer 6433 (E). Hillsborough Co.: G. V. Nash 2470 (G--isotype). Lee Co.: W. Kellogg s.n. [Owanita, 18 March 1907] (G); P. C. Standley s.n. [thicket along river, Pondilla, 8 March 1927] (W). Manatee Co.: Rugel 305 (E, F); S. M. Tracy 6650 (E, G). Volusia Co.: Mell s.n. [Daytona, 24 Jan. 1907] (E). The Nash 2470 which she cites from "NY" is actually in the Columbia University herbarium; the "Mattern" s.n. which she cites is doubtless the Mattern & Mattern s.n. cited by me below; the "Small 8469" which she cites is a

typographic error for Small 8649; and the "Standley s.n." which she cites may be the P. C. Standley 52577 cited by me. She says "Verbena tampensis, apparently endemic in peninsular Florida, is very similar in habit to V. canadensis. It differs in having more shallowly incised or dentate leaves, a strigillose calyx, slightly longer nutlets, and essentially glandless anthers. The nutlets are enlarged at the base somewhat more than those of closely related species."

In all, 87 herbarium specimens, including the types of all the names involved, have been examined by me.

Citations: FLORIDA: Brevard Co.: Brown & West s.n. [Rockledge, 4-6-28] (Fl--20981); W. M. Canby s.n. [Febr. 1889] (Pa); Curtiss 1963, in part [low open woods, Indian River, June] (Bc, C, Cm, I, Pa, Vt), 5706 (Ka); Mattern & Mattern s.n. [Titusville, March 31, 1914] (W--910330); W. H. Rhoades s.n. [Cocoa, Sept. 7, 1936] (Fl--12861, H--51418), s.n. [Indianola, Feb. 3, 1937] (Fl--25896); J. K. Small 8732 (N), s.n. [Cocoa, May 9, 1918] (Hi--7209, Up). Dade Co.: Edw. Palmer 396, in part (Bc). Hillsborough Co.: F. S. Blanton 6936 (Ml, N), s.n. [Dec. 14, 1930] (I); A. P. Garber s.n. [Tampa, May 1876] (C, W--265076); G. V. Nash 2470 (C--type, Es--isotype); C. L. Pollard s.n. [Tampa, March 7, 1898] (W--328227). Lake Co.: J. K. Small 8649 (N). Lee Co.: Buswell s.n. [June 1930] (Bu); C. C. Deam 58711 (Dm, N), 58795 (Dm, N), 60759 (N); P. C. Standley 52577 (W--1308777). Manatee Co.: C. H. M. Barrett 13 (W--893560); Cuthbert s.n. [Palma Sola, March 26, 1926] (Fl--20983); P. Dowell 7101 (N, Um--47); Nebb s.n. [March 1887] (Pa); Rugel 305 (Bm, N, W--512258); S. M. Tracy 6650 (N, N, W--383903), 7808 (Cm); Weber & Kelbert s.n. [Palmetto, 3-15-28] (Fl--20980). Orange Co.: H. N. Moldenke 212 (E, N, Up, Ur). Pinellas Co.: Beckwith 772 (W--1200200); R. F. Thorne 10281 (Ca--965339). Polk Co.: McFarlin 4477 (Gg--237856). Saint Lucie Co.: Small & Matthaus 9635 (H--43153, S, W--1738478). Sarasota Co.: Fattig s.n. [Venice, 4-24-28] (Sa); H. N. Moldenke 1039 (B, E, Go, H--5480, N, S, Up, Ur, W--1567275); H. H. Rusby s.n. [Sarasota, Febr. 12, 1935] (N); B. H. Smith s.n. [Osprey, March 17, 1904] (Cm, H--23135). Volusia Co.: F. Beckwith 773 (W--1200201); S. M. Deam 1831 (Du--80274); Eastwood s.n. [Holly Hill, May '90] (Bl--42278); Friesner 2037 (Bt--5987, Bt--5994, Bt--6028); B. H. Patterson s.n. [Daytona, Feb. 23, 1918] (Cm), s.n. [Daytona, Feb. 1925] (Cm); J. K. Small 8686 (Fl--27705, N, N, S, W); Small & DeWinkeler 9856 (S). Merritt's Island: A. A. Baldwin 70 (N). County undetermined: H. C. Beardslee s.n. [Cheney Highway, March 15, 1933] (Ob--97290); Collector undesignated s.n. (Vt, Vt).

xVERBENA TEASII Moldenke, Phytologia 2: 28--29. 1941.

Synonymy: Verbena erinoides x hybrida Dermen, Cytologia 7: 163. 1936. Verbena hybrida x erinoides Dermen, Cytologia 7: 163, 165, & 169. 1936. Verbena hybrida x erinoides Teas ex Moldenke, Suppl. List Invalid Names 9, in syn. 1941. Verbena hybrida Voss x V. tenuisecta Briq. ex Moldenke, Alph. List Invalid Names 47, in syn. 1942. Verbena teash Moldenke, Am. Midl. Nat. 59: 362, sphalm. 1958. Verbena tenuisecta Briq. x V. hybrida Voss ex Moldenke, Résumé 376, in syn. 1959.

Bibliography: Dermen, Cytologia 7: 163, 165, & 169, fig. 3—5, 23, 24, & 43. 1936; Moldenke, Suppl. List Invalid Names 9. 1941; Moldenke, Phytologia 2: 28—29. 1941; Moldenke, Alph. List Invalid Names 47. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 74 & 102. 1942; Moldenke in Lundell, Fl. Texas 3 (1): 41. 1942; Moldenke, Phytologia 2: 66, 70, 78, 83, & 117. 1945; Moldenke, Alph. List Cit. 1: 17, 20, & 23. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 24, 25, & 27. 1947; Moldenke, Castanea 13: 121. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 85. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 165 & 199. 1949; Moldenke, Alph. List Cit. 3: 970 (1949) and 4: 987. 1949; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Journ. Calif. Hort. Soc. 15: 82 & 83. 1954; Moldenke, Am. Midl. Nat. 59: 362. 1958; Moldenke, Résumé 224, 364, 366, 376, & 474. 1959; Moldenke, Phytologia 8: 121. 1961; A. Putz, N. Y. Herald Trib., sec. 4, p. 18, February 4. 1962; Moldenke, Phytologia 9: 315. 1963.

Illustrations: Dermen, Cytologia 7: 163, fig. 3—5, 165, fig. 23 & 24, & 169, fig. 43. 1936; A. Putz, N. Y. Herald Trib., sec. 4, p. 18, February 4 [as "V. erinoides"]. 1962.

This is the garden hybrid between V. tenuisecta Briq. and xV. hybrida Voss, with intermediate characters. Stems decumbent or ascending, abundantly branched; branches ascending, slender, obtusely tetragonal, sparsely or densely whitish-hirsutulous with rather stiff hairs or merely spreading-pilose, the smaller branches often more acutely tetragonal; leaves decussate-opposite, very variable in shape and size, varying from densely strigose with long white appressed hairs on both surfaces to sparsely strigillose above and spreading-pubescent along the midrib and larger venation beneath, more or less deeply incised-pinnatifid or irregularly incised, often more or less 3-parted, the lowest divisions usually again pinnatifid-incised, the lobes all sharply acute at the apex, the body of the leaf-blade and the lowest lobes often relatively broad, with recurved secondary lobes; spikes at first flattened-subcapitate, later elongating to 15 cm. or more, very densely many-flowered, the flowers closely imbricate before, during, and after anthesis; peduncles (1.5—7 cm. long) and rachis slender, acutely tetragonal, densely hirsutulous or spreading-pilose, not glandular; bractlets relatively very short, lanceolate, about 4 mm. long, about 1/3 as long as the calyx, attenuate at the apex, rather densely white-strigillose with appressed hairs, densely white-ciliate

toward the base; calyx elongate-tubular, 8—13 mm. long, densely short-pubescent with spreading hairs or white-strigose with closely appressed hairs; corolla hypocrateriform, showy, varying from blue or purple to pink or white, its tube 15—20 mm. long, about 1 1/3 times as long as the calyx, glabrous throughout or slightly puberulent at the apex on the outer surface, the limb 5—9 mm. wide.

This hybrid appears to have been made first in the nurseries of Edward Teas at Houston, Texas, in 1926, and was called "V. hybrida x erinoides" by him. It is typified, however, by a collection made by Glendon A. Stevens (no. 4) at Harrisburg, Dauphin County, Pennsylvania, on June 20, 1933, and deposited in the herbarium of the Bailey Hortorium at Cornell University, Ithaca, New York. In 1936 it was produced artificially by Dermen in Massachusetts.

Under the collective name, xV. teasii, I include the garden varieties called Albion, Bellaire, Ceres, Madge Roberts, Rowena, Ruth, and Teas Hybrid Verbena or Teas Hybrid Vervain. The corolla is white in Albion, pink in Rowena and Ruth, purplish in Bellaire, and dark-red in Ceres. The plant has been collected in anthesis in April, June, July, and October, so apparently has a long blooming period. Material has been distributed in herbaria under the names V. incisa Hook., "V. erinoides hybrid", and "Common verbena x erinoides". Madge Roberts is said by Teas to be "probably the best of the race". Bailey says for his unnumbered specimens, cited below, collected on July 22 and on October 3, 1927 "root from Edw. Teas, Houston, Tex., in spring of 1927"; his no. 7394 represents Bellaire, 7395 is Ceres, and 7396 is Madge Roberts.

A letter written by G. A. Stevens of the G. Horace McFarland Company, Harrisburg, Pennsylvania, addressed to Dr. Liberty Hyde Bailey and dated June 20, 1933, is of considerable interest in the information it gives about the color forms of xV. teasii:

"Dr. McFarland wrote you today about the Texas verbenas. I am sending you by accompanying mail some samples which I hope will reach you in fair condition at least.

"I am afraid that Dr. McFarland got the history of them a little mixed. Teas sent us originally four varieties. They were named, and I believe he reported them to be selections from the native verbena or hybrids of it. The four varieties included -

"1. A purple violet type which seems to come pretty close to the botanical description of Verbena venosa.

"2. A good light rose-pink variety, a little variable in color but is very similar to the purple sort, except that the flower trusses are better filled and the plant seems to be a trifle more vigorous.

"3. A rather impure white variety which seems to have considerable pink at times in the flowers. It differs from the former two in having broader and more substantial foliage.

"4. A very ugly magenta-pink which was so bad that we threw it away at the end of the first year. I do not remember anything about it beyond that it resembled the other three in a general way.

"All four of these verbenas were reported to be hardy. They are not definitely so at Harrisburg, although they survive in a cold frame without trouble. But six miles north of Harrisburg on the southern slope of the first mountain a friend of mine has a rock garden, to which I contributed some of each of the three varieties which we kept. They flourish exceedingly well and sometimes live over winter, particularly a branch which may creep under a stone and take root there. You will note from the specimens that they are very flat trailing plants and root as they run.

"It was in that garden that the red variety originated, evidently as a sport from either the white or pink variety. You will note that the foliage of the red one closely resembles that of the white sort. I do not believe it is a seedling, since no other seedlings of these have ever appeared, although the ugly lavender type which I discarded has appeared several times in plantings of the purple sort at the mountain. We have never propagated these plants from seeds, using cuttings only. Besides in its color the red form differs from the other three in its much flatter habit and shorter growth. It is an exceedingly neat edging or bedding plant.

"I am almost positive that no verbenas of the usual garden type were growing in the garden at the mountain last year, and I know that there were none in the nearest garden to it, which is about a quarter-mile away. But the seed which produced this red verbena, if it is a seedling, must have been formed in 1931, and I cannot say definitely whether other verbenas were growing there that year, but certainly none was in the rock garden."

The illustration given by Putz (1962) is labeled "Verbena ericoides", but certainly does not represent that species; it seems clear to me that the plant depicted is xV. teasii.

In all, 21 herbarium specimens, including type material of all the names involved, and 2 mounted photographs have been examined by me.

Citations: CULTIVATED: California: Bailey & Bailey 9830 (Ba). Haiti: Ekman H.9357 (S). New York: L. H. Bailey s.n. [July 27, 1927; Bellaire] (Ba), s.n. [July 27, 1927; Ceres] (Ba), s.n. [July 27, 1927; Rowena] (Ba), s.n. [July 27, 1927; Ruth] (Ba), s.n. [Oct. 3, 1927; Rowena] (Ba). Pennsylvania: G. A. Stevens 1 (Ba), 2 (Ba), 3 (Ba), 4 (Ba—type, N--photo of type, Z—photo of type). Texas: L. H. Bailey 7394 (Ba), 7395 (Ba), 7396 (Ba); Teas s.n. [June 2, 1926; Albion] (Ba), s.n. [June 1926; Albion] (Ba), s.n. [June 1926; Bellaire] (Ba), s.n. [June 1926; hybrids] (Ba), s.n. [June 1926; Madge Roberts] (Ba), s.n. [June 1926; Rowena] (Ba), s.n. [June 1926; Ruth] (Ba).

VERBENA TENERA Spreng. in L., Syst. Veg., ed. 16, 2: 750. 1825.

Synonymy: Shuttleworthia tenera Walp., Repert. 4: 13. 1845. Schuttleworthia tenera Walp. apud Morren, Hort. Belg. 20: 111, in syn. 1870. Verbena geraniifolia Hort. ex Rümpler in Vilm., Ill-

ustr. Blumeng., ed. 1, 1261. 1873. Verbena geraniaefolia Hort. apud Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1178, in syn. 1895. Verbena tenera Griseb. ex Alvarez, Fl. Sant. del Estero 106. 1919. Verbena apulchellas Sw. ex Augusto, Fl. Rio Grande do Sul 233, sphalm. 1946. Glandularia tenera (Spreng.) Cabrera, Man. Fl. Alreded. Buenos Aires 398. 1953. Verbena tenuisecta f. arenaria Herter ex Moldenke, Résumé 376, in syn. 1959. Verbena montana Lillo ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963 [not V. montana Hort., 1895]. Verbena tenella Michx. ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963. Verbena tenera Auct. ex Moldenke, Résumé Suppl. 8: 6, in syn. 1964. Verbena tenera Briq. ex Moldenke, Résumé Suppl. 8: 6, in syn. 1964.

Bibliography: Spreng. in L., Syst. Veg., ed. 16, 2: 750. 1825; Reider, Ann. Blumisterei 8: [pl. 12]. 1832; Steud., Nom. Bot., ed. 2, 2: 750. 1841; D. Dietr., Syn. Pl. 3: 604. 1843; Walp., Repert. 4: 13 & 34. 1845; Schau. in A. DC., Prodr. 11: 551 & 552. 1847; C. Gay, Hist. Fis. Chile Bot. 5: 7. 1849; Schau. in Mart., Fl. Bras. 9: 193. 1851; Regel, Gartenfl. 4: pl. 142. 1855; Van Houtte, Fl. des Serres 11 [ser. 2, 1]: pl. 1129. 1856; Vilm., Fl. Pl. Terre, ed. 1, 938. 1865; Morren, Belg. Hort. 20: 111--112. 1870; Rümpler in Vilm., Illustr. Blumeng., ed. 1, 1261--1263. 1873; Lorentz, Veg. Nordeste Prov. Entre Ríos, ed. 1, 38, 87, 150, & 172. 1878; Griseb., Abh. K. Gesell. Wiss. Götting. 24: [Symb. Fl. Argent.] 277. 1879; Regel, Gartenfl. 28: 372--373. 1879; F. Phil., Cat. Pl. Vasc. Chil. 221. 1881; J. Ball, Journ. Linn. Soc. Lond. 27: 497. 1891; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 148. 1894; Vilm., Fl. Pl. Terre, ed. 3, 1198. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 895, 1178, & 1179. 1895; L. H. Bailey in A. Gray, Field Forest & Gard. Bot. 341. 1895; Bois, Atlas Pl. Jard. pl. 227. 1896; Step, Fav. Fl. Gard. & Greenh. 3: pl. 220. 1897; Kuntze, Rev. Gen. Pl. 3 (2): 258. 1898; Speg., Anal. Soc. Cient. Argent. 53: 249. 1902; Ed. Rodigas, Bull. Arboricult. Belg. 1902: 113. 1902; Briq., Ann. Conserv. & Jard. Bot. Genèv. 7-8: 296--297. 1904; Macloskie in W. B. Scott, Rep. Princeton Univ. Exped. Patag. 8 (2): 689. 1905; Hicken, Chlor. Plat. Argent. 198. 1910; Gerth van Wijk, Dict. Plantnames 1: 1398. 1911; Hauman-Merck, Anal. Mus. Argent. Hist. Nat. Buenos Aires 24: 414--415. 1913; Gerth van Wijk, Dict. Plantnames 2: 1549. 1916; Alvarez, Fl. Sant. del Estero 106. 1919; Druce, Rep. Bot. Exch. Club Brit. Isles 1918: 298. 1919; Hegi, Illustr. Fl. Mittel-Eur. 5 (3): 2239. 1927; Seckt, Rev. Univ. Nac. Cordoba 17: 91. 1930; Herter, Florula Urug. 105. 1930; Stapf, Ind. Lond. 6: 431. 1931; C. I. Sandw., Rep. Bot. Exch. Club Brit. Isles 1932: 348. 1933; Parodi, Rev. Argent. Agron. 1: 202. 1934; L. H. Bailey, Cat. Florists Handl. Verbenac. mss. 1935; L. H. & E. Z. Bailey, Hortus, new rev. ed., 632. 1935; Herter, Revist. Sudam. Bot. 4: 186--187. 1937; Gallinal, Bergalli, Campal, & Rosengurtt, Stud. Nat. Mead. Urug. 81, 118, 122, 134--136, 141, 147, & 153. 1938; Moldenke, Alph. List Common Names 32. 1939; Moldenke, Suppl. List Common Names 10. 1940; Moldenke, Saxiflora pl. 16.

1940; Moldenke, Carnegie Inst. Wash. Publ. 522: 150. 1940; Beale, Journ. Genet. 40: 338. 1940; Ragonese, Darwiniana 5: 413. 1941; Moldenke in Lundell, Fl. Texas 3 (1): 41. 1942; Schnack, Anal. Inst. Fitotéc. Sta. Catalina 4: 19. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 39, 41, 44, 75, & 102. 1942; Herter, Revist. Sudam. Bot. 7: 225. 1943; S. A. Cain, Found. Pl. Geogr. 335. 1944; Darlington & Janaki Ammal, Chromosome Atl. 270. 1945; J. T. Roig, Plant. Medic. Cuba 671 & 811. 1945; Moldenke, Phytologia 2: 117. 1945; Augusto, Fl. Rio Grande do Sul 213 & 233. 1946; Moldenke, Alph. List Cit. 1: 40 & 96. 1946; Lorentz, Veg. Nordeste Prov. Entre Ríos, ed. 2, 38, 87, 150, & 172. 1947; Moldenke, Phytologia 2: 339 & 348. 1947; Moldenke, Wrightia 1: 233. 1948; Moldenke, Castanea 13: 117. 1948; Neal, In Gard. Hawaii 636. 1948; Moldenke, Alph. List Cit. 2: 357, 375, 378, 442, 457, 458, 532, 533, 575, 598, 599, 620, 632, & 644 (1948), 3: 662, 678, 688, 703, 732, 766, 771, 781, 840, 849, 904, 909, 911, 920, & 922 (1949), and 4: 993, 1080, 1104, 1164, 1165, 1172, 1175, 1178, & 1302. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94, 100, 107, 165, & 199. 1949; Moldenke, Phytologia 3: 79. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 14. 1949; Moldenke, Phytologia 3: 289 & 291 (1950) and 3: 454 & 468. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2212--2213. 1951; Stellfeld, Trib. Farmac. 19 (10): 167 & 172. 1951; Datta, Caryologia 5: 359--370. 1952; J. T. Roig, Dicc. Bot. 1: 909 (1953) and 2: 1114. 1953; Cabrera, Man. Fl. Alreded. Buenos Aires 398. 1953; Moldenke, Phytologia 4: 188. 1953; Moldenke, Journ. Calif. Hort. Soc. 15: 83. 1954; Rambo, Sellowia 6: 153. 1954; Moldenke, Inform. Mold. Set 51 Spec. 4. 1956; Soukup, Biota 1: 181. 1956; Bally, Biol. Abstr. 30: 3351. 1956; Moldenke, Biol. Abstr. 30: 1092--1093 & 3551. 1956; Angely, Fl. Paran. 7: 13. 1957; Biol. Abstr. 30: 4360. 1958; Moldenke, Am. Midl. Nat. 59: 363. 1958; Reitz, Sellowia 11: 57 & 134. 1959; G. Taylor, Ind. Kew. Suppl. 12: 63. 1959; Moldenke, Résumé 111, 120, 128, 129, 224, 344, 357, 376, 423, & 474. 1959; Angely, Fl. Paran. 16: 79. 1960; T. H. Everett, New Illustr. Encycl. Gard. 13: 2405—2406. 1960; Moldenke, Résumé Suppl. 2: 11 & 13. 1960; Angely, Fl. Paran. 17: 47. 1961; Moldenke, Phytologia 8: 121, 123, 141, & 204 (1961) and 8: 398 & 435. 1962; Cuf., Bull. Jard. Bot. Brux. 32: Suppl. 788. 1962; Moldenke, Résumé Suppl. 3: 32 (1962), 4: 19 (1962), 6: 1, 7, 9, & 11 (1963), and 7: 9. 1963; Sharma & Mukhopadhyay, Journ. Genet. 58: 380. 1963; Moldenke, Phytologia 9: 70—72, 84, 87, 197, & 203 (1963), 9: 393, 395, 397, 399, & 403 (1963), 10: 148 & 158 (1964), and 11: 23--25, 51, & 123. 1964; Moldenke, Résumé Suppl. 8: 6. 1964.

Illustrations: Reider, Ann. Blumisterei 8: [pl. 12] (in color) [as V. pulchella]. 1832; Morren, Belg. Hort. 20: 111 [in color]. 1870; Bois, Atlas Pl. Jard. pl. 227 [in color]. 1896; Step, Fav. Fl. Gard. & Greenh. 3: pl. 220 [in color]. 1897; T. H. Everett, New Illustr. Encycl. Gard. 13: 2405. 1960.

Typically quite small, long-trailing or creeping plant, suffruticose at the base; stems cespitose, filiform, much-branched,

diffuse, decumbent, rooting at the nodes; branches ascending, filiform, diffuse, tetragonal, pubescent and retrorsely muriculate; leaves decussate-opposite, rather firm, decurrent at the base into a short petiole; leaf-blades dark-green above, paler beneath, 3-parted and multifid or pinnatifid-laciniate to -dissected, the lobes linear, entire, rather acute at the apex, shiny, subrevolute, scattered-strigillose; inflorescence terminal, pedunculate, the spikes solitary or ternate, at first fasciculate, elongating after anthesis, subcanescent; bractlets lanceolate, about 5 mm. long, acuminate at the apex; calyx elongate, 6--10 mm. long, membranous, plicate, hirtellous, the pubescence ascending-spreading, not appressed and not glandular, the ribs herbaceous, prominulous, the rim oblique, the teeth subulate; corolla infundibular, varying from wholly pink, pink, rose, light-pink, or violet-pink to violet, lilac, purple-lilac, purple, dark-purple, blue-purple, blue-violet, lilac-blue, or even blue, glabrous outside or puberulous above, its tube 10--15 mm. long, usually almost twice as long as the calyx, barbate within at the stamen insertion, otherwise glabrous, the limb medium-sized, the lobes uniformly colored, cuneate-obcordate; appendages on the upper anthers clavate or claviculate, subrecurved, glandulose, included or not very conspicuously exserted, dark-violet; fruiting-calyx contracted and contorted beyond the fruit, about 3 mm. long; cocci 4, subterete, fuscous, striate on the back, reticulate-scrobiculate except at the very base, the commissural surface smoothish; chromosome number: 2n = 10 or 30.

The type of this species was collected by Friedrich Sellow at Montevideo, Uruguay, and was deposited in the herbarium of the Botanisches Museum at Berlin, but is now destroyed.

This is a much misunderstood species. By horticulturists the name is often misapplied to V. pulchella Sweet, but in V. tenera the spikes elongate after anthesis and typically the plant is quite small, while in V. pulchella the spikes do not elongate and the plants are often quite large. It is also often confused with V. tenuisecta Briq., from which it may be distinguished at once by its calyx pubescence being ascending-spreading hirtellous instead of appressed-strigose. Cultivated forms have the leaves closely resembling those of V. dissecta Willd. and V. laciniata (L.) Briq., from both of which species they differ in having the bractlets about 5 mm. long and the calyx about 10 mm. long. Schauer (1851) says "calyce.....strigoso-pubescente.....ad angulos glandulis patellaeformibus brevibus stipitatis consperso duplo brevioribus". Meisner described the cocci as splitting in pairs, but Schauer contradicts this.

Hauman-Merck (1913) cites his no. 349 and says that the species is abundant in sandy places in Río Negro, Argentina. He comments that it is difficult to separate from V. erinoides Lam. and that Grisebach in his Pl. Lorentz. mistook them, but that the distinctive features given in his Symb. Fl. Argent. (no. 1746) are of no value since some specimens of V. tenera are also herbaceous and

have leaves with linear segments as in V. erinoides. He states that careful comparison of the descriptions of the two species in DeCandolle's Prodromus reveals only one difference: the glands on the calyx in V. tenera (which he admits that he has never seen on Argentine specimens). He concludes that from a study of literature and numerous actual specimens the distinguishing characters are: V. tenera -- staminal glands pyriform punctate under a hand-lens, almost as large as the anthers and distinctly visible in the corolla-throat; V. erinoides -- staminal glands cylindric, much smaller than the anthers, included or hardly visible in the corolla-throat.

Steudel (1841) places V. pulchella Hort. in the synonymy of V. tenera. Morren (1870) places V. pulchella Sweet and Schuttleworthia pulchella Meisn. in the synonymy of V. tenera; Schauer (1847 & 1851), Jackson (1895), and Augusto (1946) do the same, and so does A. Saint-Hilaire, but I regard this as incorrect. The two species are abundantly distinct. Morren shows three color forms of V. tenera on his unnumbered color plate. Regel (1879) reduces V. tenera to synonymy under V. pulchella, and also places V. sabini Hort. and V. multifida Hort. there -- the former is regarded by me as V. laciniata var. sabini (Sweet) Moldenke and the latter as V. laciniata (L.) Briq. Briquet (1904) opined that V. sabini Sweet might belong with V. tenera. Neal (1948) regards V. tenera as a synonym of V. pulchella, but the plants referred to by her all prove to be V. tenuisecta Briq. Rümpler (1873) and Rodiges (1902) also reduced V. tenera to synonymy under V. pulchella.

It should be noted here that the Alvarez, Fl. Sant. del Estero 106 (1919) reference is sometimes given as page "109" in error -- on that page there is only a picture of Iodina rhombifolia of the Santalaceae.

Osten, in a note about the plant now called xV. uruguayensis Moldenke (which see), questions whether Briquet's use of the name V. tenera is the same as Sprengel's, but I see no reason to doubt it.

The type of V. tenuisecta f. arenaria is apparently Herter 749, collected in dry and sandy sunny places along the seashore at Uararrillas, dept. Rocha, Uruguay, between November 15 and 17, 1948; V. montana Lillo seems to be based on Venturi 6726 from Tucumán, Argentina, and V. tenella Michx. is based on C. T. Mohr s.n. from Mobile, Mobile County, Alabama, collected on May 10, 1893. Verbena montana Hort. is a synonym of V. canadensis (L.) Britton. The V. tenera var. tristachya Troncoso & Burkart is now known as V. tristachya Troncoso & Burkart; the so-called V. tenera x aubletia Winge is xV. wingei Moldenke; V. tenera x incisa x erinoides Hegi is xV. trinitensis Moldenke; and V. tenera x lanceolata Kellogg is V. tenuisecta Briq. The "V. tenera" portions of

these hybrid designations are based on misidentifications. The only true hybrid known to me thus far involving the authentic V. tenera is with V. peruviana (L.) Briq. and is now known as xV. uruguayensis Moldenke.

Verbena tenera has been collected in dry sandy sunny places along the seashore, on ballast ground, in low places in meadows, in fields and low or sandy fields, campos and pampas, dry grassy campos, dry meadows, and in sandy rather bare dry or moist places. Herter found it in sandy rocky soil in dry hollows exposed to full sunlight; Rambo encountered it in a region of 2 meters rainfall and 0—25° temperature range. Other collectors have found it in sandy or rocky soil, dry rocky pastures, grassy slopes, river forests, pastured thorn-bush, and on the littoral, at altitudes of 25 to 2500 meters, flowering from September to April and in July, fruiting in November, December, and March. It has been in cultivation since at least 1832.

Among its recorded vernacular names are "camaradinha", "formosa sem dote", "jurupeba", "margarita morada", "sacha-alfa", "sister vervain", "te de burro", "Uruguayan verbena", "Uruguayan vervain", "verbena americana", "verveine délicate", "verveine gentille", "verveine jolie", and "yerba meona". The name "sacha-alfa" is applied also to V. laciniata (L.) Briq. in Argentina according to Alvarez (1919), while "camaradinha", "formosa sem dote", and "jurupeba" seem to be applied to all the species of this genus growing in southern Brazil.

In my 1948 publication I pointed out that V. tenera was not known from Texas, even in cultivation, when I prepared my discussion of this family for the Flora of Texas. Now it is known to be cultivated there and, like all cultivated vervains, may be expected eventually as an escape or naturalization. It is not nearly as common in cultivation anywhere as V. tenuisecta, which it closely resembles, but from which it differs in its bractlets being about half (instead of 1/4) as long as the calyx and densely long-ciliate on the margins and in the short but spreading often hirsutulous pubescence on the calyx (instead of the closely appressed-strigose pubescence seen in V. tenuisecta).

The corolla color is described as "pink" on Reitz 3481; "wholly pink" on Moldenke 8070; "light-pink" on N. Y. Bot. Gard. Cult. Pl. R.75/34; "violet-pink" on Herter 749; "rose" on Reitz & Klein 7460; "lilac" on Burkart 18149, Legrand 2664, and Osten 2748; "purple-lilac" on Osten 19032; "purple" on Berro 8701 & 8775; "dark-purple" on Lundell 10938; "blue-purple" on Berro 8205; "blue-violet" on Hauman s.n.; "blue or violet" on Berro 4752; "violet" on Arechavaleta 23, Berro 4323, Burkart 22380, Gallinal & al. PE.5048, Hunziker 3733, 5160, & 6471, Krapovickas 2752, Legrand 1942, and Schröder s.n.; and "blue" on Berro 134, 4753, 4754, 6720, 8219, & 8390 and Sparre 412. Moldenke 8070 is said to have originated as a mutant from material of var. maonetti Regel.

Bally (1956) notes that contrary to Beale, who found in an American strain of this species a chromosome count of 2n = 30, Datta found in an Italian strain a count of 2n = 10. Different types of meiotic irregularities were met with, including nondisjunctions. The occurrence of multivalents in some individuals with 2n = 10 chromosomes is ascribed by Datta to those plants having resulted from the union of two abnormal gametes, one lacking one chromosome, the other possessing an extra one, the latter being of another type from the one missing in the other gamete. Plants with the normal diploid number may thus originate with a genomic constitution differing from the normal. An unusually high number of secondary constrictions is reported by Datta, which may have originated through non-homologous interchanges involving nucleolar chromosomes.

Swallen describes the species as "very common on campo" along roadsides in Rio Grande do Sul; Burkart found it "common in low places in meadows" in the province of Buenos Aires; Hunziker describes it as "frequent at edge of highway" in Córdoba; while Osorio says "entre les piedras del terraplen al costado de la carretera" in Uruguay. Bailey (1935) reports that its seeds are offered to the horticultural trade by Kew. Douglas H. Kent, in a letter to me dated November 28, 1949, reports that the species is adventive in England. Roig (1945) says "propiedado vulnerarias y adamás sirven para lavar el pelo y evitar su caída" in Cuba. Everett (1960) notes that "Verbena tenera and its variety are not generally hardy in the north, although they may survive in sheltered locations as far north as Philadelphia." Gay (1849) says of the genus Verbena "En Chile son muy comunes, pero es sin duda por equivocacion que se le ha mencionado la Verb. tenera de Spr."

The labels on Macbride's type photograph no. 17450 are inscribed "Brazil", but the specimen depicted was collected by Friedrich Sellow (no. 99) in fields about Montevideo, Uruguay, and is probably to be regarded as the actual type of the species, deposited in the Berlin herbarium and now lamentably destroyed.

The Jürgensen 1737 collection cited below was erroneously cited by me in my Alph. List Cit. 2: 599 (1948) as V. microphylla H.B.K. His no. 1026 is a mixture with V. glandulifera Moldenke. Material of V. tenera has been misidentified and distributed in herbaria under the names V. alpina Hort., V. chamaedrifolia Cham., V. dissecta Willd., V. erinoides Lam., V. glandularia Jürgensen, V. laciniata (L.) Briq., V. microphylla H.B.K., V. pulchella Sweet, V. radicans Gill. & Hook., V. santiagensis Brücher, V. sororia Don, V. tenuisecta Briq., and Schuttelworthia pulchella Meisn. On the other hand, the J. H. Kellogg s.n. [Mo. Bot. Gard., Aug. 25, 1911], distributed as V. tenera, is actually V. ambrosifolia Rydb.; Kuntze s.n. [Ceres, Oct. 1892] is V. dissecta Willd.; J. H. Cowen s.n. [Cornell U., Ithaca, April 1900] is V. pulchella Sweet; Cabrera 3244, Castellanos s.n. [Valle de los Reartes, Dec. 15, 1919], Che-

bataroff s.n. [San Javier, 1939], Dusén 9341, Eastwood s.n. [Huntington's Place, Aug. 1915], J. G. Gilmore 1792, Herb. Decaisne s.n. [H. P.], Herb. Osten 13012, 15290, 17303, 19032, & 23345, Herter s.n. [Nueva Palmira], Hieronymus s.n. [14.XI.1875], s.n. [near Córdoba, 14.XI.1876], & s.n. [in vicinity of Córdoba, Nov. 18, 1876], R. Jones 102, Kuntze s.n. [Córdoba, 15/XII/1891], Lefebre s.n. [1885], Lilliesköld s.n., Lorentz 1483.6, Neal s.n. [Apr. 11, 1929], Osten 13107, Parodi 8962, Pedley 534, H. M. Pollard s.n. [June 7, 1957], Schröder s.n. [dept. Paysandú, Dec. 1924], H. H. Smith 140, H. M. Smith 5, Stratton 6125 (in part), Torrey & Wood s.n. [July 3, 1946], Troncoso 984, and E. Wall s.n. [Nelspruit, 25/10/38] are V. tenuisecta Briq.; and Hauthal 26 is V. thymoides Cham.

Schauer (1847) cites Sellow s.n. from "in campis Brasiliae meridionalis" and Arsene-Isabelle s.n. and Bacle s.n. from "civit. Platensium" in the Berlin and DeCandolle herbaria. In Rep. Bot. Exch. Club Brit. Isles (1919 & 1933) there are cited a collection by Misses Cobbe from a "rubbish tip, Bedminster, Bristol", England, in 1918, and a collection made by C. I. Sandwith in 1932. Ragonese (1941) cites his nos. 2003 and 2396 from Santa Fé, Argentina. Augusto (1946) cites a Sellow s.n. and Isabelle s.n. from "campos de Montevideo", Borrmüller s.n. from "Rio Grande do Sul, Salto Alegre, ao norte de Pindorama", and Augusto & Edésio s.n. from "Praia de Tramanda" in Rio Grande do Sul.

In all, 181 herbarium specimens, including the type collections of most of the names involved, and 2 mounted photographs have been examined by me.

Citations: ALABAMA: Mobile Co.: C. T. Mohr s.n. [Mobile, May 10, 1893] (W--771882), s.n. [Mobile, June 3 to Sept. 1893] (W--771883). BRAZIL: Paraná: L. Fernandez s.n. [Herb. Mus. Paran. 3383] (N); Herb. Mus. Nac. Rio Jan. 46598 (Ja). Rio de Janeiro: N. J. Andersson s.n. [1851] (S). Rio Grande do Sul: Buck 1837 (N); C. Camargo 62124 (S); Friedrichs 32939 (N); Jürgens 118 (B); Malme 242 (S), 348 (N, S); Rambo 34719 (N, S); A. R. Schultz 508 (N); Schwacke II.262 (Ja--46577); Sehnem 3466 (Gg--356387), 5052 (B); Swallen 7391 (W--1903226). Santa Catarina: F. Müller 95 (Ja--46533); Reitz 3481 (N); Reitz & Klein 7460 (Mm), 7724 (Mm), 7919 (S, Z). State undetermined: Sellow 427 (Vt), s.n. [Brasilia] (Br, N, Vt). URUGUAY: N. J. Andersson s.n. [Monte Video, 1852] (S); Arechavaleta 23 (Ug); H. H. Bartlett 19862 (Mi), 20821 (Mi, Mi, W--1907610); C. Berg 161 (Ug--9615); Berro 134 (N), 4323 (N), 4752 (N), 4753 (N), 4754 (N), 6720 (N), 6800 (N), 8205 (N), 8219 (N), 8390 (N), 8701 (N), 8702 (N), 8775 (N), s.n. [Mercedes, Jan. 10, 1899; Herb. Osten 3746] (Ug); Cabrera 3244 (N); Castellanos s.n. [near Cerro Pelado, Dec. 26, 1946; Herb. Inst. Miguel Lillo

11755] (N, N), s.n. [La Coronada, Dec. 9, 1947; Herb. Inst. Miguel Lillo 11766] (N), s.n. [Arroyo Casupá, Dec. 7, 1947; Herb. Inst. Miguel Lillo 11768] (N), s.n. [Manantial, Jan. 23, 1947; Herb. Inst. Miguel Lillo 15126] (N), s.n. [Cerro Verde, Jan. 18, 1947; Herb. Inst. Miguel Lillo 15138] (N, N), s.n. [entre Arroyo Timote y Mansavillagra, Nov. 1, 1946; Herb. Inst. Miguel Lillo 15774] (N); Felippone 5915 (N); Gallinal, Aragone, Bergalli, Campal, & Rosengurtt 2299 (W--1742790), PE.5048 (Ug--8175); Herter 181a [Herb. Herter 68181] (Ca--278518), 181b [Herb. Herter 32157] (Ca--278519), 181c [Herb. Herter 79227] (Ca--278521, N), 181 1/2 [Herb. Herter 96600] (N), 749 [Herb. Herter 50596] (S); Herter & Strahl 181 [Herb. Herter 79174] (Gg--222541, N, S); Legrand 250 (Ug), 1942 (Ug), 2664 (Ug), 2717 (N, Ug), 3856 (Ug), 4440 (Ug), 4590 (Ug); Moldenke & Legrand 2791 (N, Ug); Moldenke & Moldenke 19692 (Es, F, Mg, Mr, N, No, Ot, S, Sm, Ss, Ss), 19696 (Es, N, Ot, Ot, Sm); Osorio 199 (Ug--13002), 273 (Ug--12957); Osten 19032 (Ug); Rosa Mato 322 (Ug--9812); A. Saint-Hilaire C^2.1882 ter (N); Schröder s.n. [Santa Ysabel, Feb. 28, 1922; Herb. Osten 16546, in part] (Ug); Sellow 99 [Macbride photos 17450] (Kr--photo of type, N--photo of type); H. M. Smith 5 (W--1193661), 140 (W--1193793); G. Teague s.n. [Cuchilla Pereyra, Feb. 22, 1947; Herb. Inst. Miguel Lillo 11760] (N, N), s.n. [Carrasco, Montevideo] (Ug--12282).

ARGENTINA: Buenos Aires: Boffa 25 (N, N, S); Burkart 18149 (N), 22380 (W--2371533); Cabrera 1860 (N); Commerson s.n. [Buenos Ayres] (N); Hauman s.n. [Bahia Blanca, XII.1905] (Br), s.n. [Sierra de Ventana, Nov. 1914] (Br); Hunziker 3333 (N); Krapovickas 1990 (Ca), 2752 (N); Lejeune s.n. [1827] (Br); Mansel s.n. [Bahia Blanca, 1884] (Bm); T. Meyer 2409 (N); Osten 2748 (Ug); Parodi 8962 (N); Remiro s.n. [Mercedes, 20,V.1943] (Mv); Rodriguez V. 667 (S); Scala & Cabrera 11 (N); Sparre 189 (S). Catamarca: Jörgensen 1026, in part (Ca--192385), 1737 [Herb. Inst. Miguel Lillo 31472; Herb. Osten 11009] (N, Ug, W--874768). Córdoba: Hieronymus s.n. [Herb. Krause 16830] (Ca--453738); Hunziker 6471 (N); Meyer & Sleumer s.n. [T. Meyer 15579] (B); Rodrigo 255 (N); Scala 10002 (N). Corrientes: Alboff s.n. [environs de la ville de Corrientes](N); Castellanos s.n. [Herb. Mus. Argent. Cienc. Nat. 34481] (N); Edw. Palmer s.n. (W--227527). La Rioja: Hunziker 5160 (N). Mendoza: Gillies s.n. [Mendoza] (Lu); Jörgensen 1026, in part (Cp); Ruíz Leal 1940 (Rl), 7092 (N), 11037 (Ss), 16934 (Z). Río Negro: Wilkes s.n. [Río Negro, Patagonia] (W--71953). Salta: Garolera & Romero s.n. [Cuesta del Obispo, 8-I-1947] (N); Schreiter 6643 [Herb. Inst. Miguel Lillo 32795] (N). Santa Fé: Job 795 (N), 1050 (N). Tucumán: Lillo 8644 [Herb. Inst. Miguel Lillo 31473] (N); Olea 236 (Ca--166279); Venturi 6726 (W--1591498); E. Wall s.n. [15/10/1946] (S).

Province undetermined: Sparre 412 [Guardia Escotta] (S). CULTIVATED: Belgium: M. Martens s.n. [Hort. Colpia or. 1832] (Br); Thielens s.n. (Br). California: Walther s.n. [Santa Monica, Sept. 9, 1927] (Gg--165705). Congo: RR. PP. Salèsiens 292 (Br). Connecticut: Bevoise s.n. [Green Farms, Aug. 1934] (Ba). Hawaii: J. W. Thompson s.n. (Pa). Louisiana: Langlois s.n. [April 1880] (I). New York: Ahles s.n. [N. Y. Bot. Gard. Cult. Pl. R.95/34] (N); Herb. Univ. Mass. s.n. [N. Y., Aug. 1864] (Ms); H. N. Moldenke 8070 (N); Moldenke & Moldenke 11882 (N); H. Schneider s.n. [N. Y. Bot. Gard. Cult. Pl. R.95/34] (Ba, N). Russia: Herb. Hort. Bot. Petrop. s.n. (W--71959). Sweden: Reuterman s.n. [31/7/1886] (Go). Texas: C. L. Lundell 10938 (N, Rf). LOCALITY OF COLLECTION UNDETERMINED: J. Anderson 33 [South America] (Bm); Collector undesignated 99 [Herb. Mus. Nac. Rio ref. IX] (Ja), 427 (Ja); Herb. Jard. Bot. Brux. s.n. [Route du Grand Canal, 800 m. alt., 13 Sept. 1897] (Br); Née 89 (Q), 97 (Q).

VERBENA TENERA var. ALBIFLORA Kuntze, Rev. Gen. Pl. 3 (2): 258. 1898.

Bibliography: Kuntze, Rev. Gen. Pl. 3 (2): 258. 1898; Moldenke, Phytologia 2: 386. 1947; Moldenke, Alph. List Cit. 2: 627 (1948), 3: 671 & 743 (1949), and 4: 1090. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 100, 107, & 199. 1949; Moldenke, Phytologia 3: 306. 1950; Moldenke, Résumé 120, 128, & 474. 1959.

This variety differs from the typical form of the species in having white corollas. It is described as a creeping plant, 40—50 cm. tall.

The type of the variety was collected by Carl Ernst Otto Kuntze at Ceres, Santa Fé, Argentina, in October, 1892, and is deposited in the Britton Herbarium at the New York Botanical Garden. The plant has been collected in sandy places, on pedregal of dry river, and on rock shelves, at altitudes of 200 to 700 meters, flowering from September to December. Material has been distributed in herbaria as "Verbena aff. laciniata". Legrand says of his no. 2665 that it was a single plant with white flowers among V. dissecta Willd.

In all, 7 herbarium specimens, including the type, have been examined by me.

Citations: URUGUAY: Legrand 2665 (Ug); Lombardo 2761 (N). ARGENTINA: Buenos Aires: Rodríguez Vaquero 666 (S); Sparre 246 (S). Jujuy: Venturi 5267 (Gg--158515, W--1591467). Santa Fé: Kuntze s.n. [Ceres, Oct. 1892] (N--type).

VERBENA TENERA var. MAONETTI Regel, Gartenfl. 4: 373, pl. 142, fig. 1. 1855.

Synonymy: Verbena maonetti Hort. ex Regel, Gartenfl. 4: 373, pl. 142, in syn. 1855. Verbena tenera maonetti Hort. ex Planch.

& Van Houtte, Fl. des Serres 11: 115, pl. 1129. 1856. Verbena pulchella var. mahoneti Vilm., Fl. Pl. Terre, ed. 1, 938. 1865. Verbena mahoneti Hort. ex Vilm., Fl. Pl. Terre, ed. 1, 938, in syn. 1865. Verbena pulchella var. mahoneti Hort. ex Rümpler in Vilm., Illustr. Blumeng., ed. 1, 1261. 1873. Verbena pulcnella var. maonetti Regel, Gartenfl. 28; 372. 1879. Verbena tenera var. maonettii Hort. ex Cowen & Bailey in L. H. Bailey, Stand. Cycl. Hort. 6: 3445. 1917. Verbena pulchella maonettii Regel ex Stapf, Ind. Lond. 6: 431. 1931. Verbena tenera maonettii Hort. ex Stapf, Ind. Lond. 6: 431. 1931. Verbena pulchella var. maonetti (Regel) Regel ex Moldenke, Cult. Pl. 35, nom. nud. 1938. Verbena alpina Hort. ex Moldenke, Prelim. Alph. List Invalid Names 44, in syn. 1940. Verbena tenera var. mahonetii Hort. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena pulchella var. maoretti Hort. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena tenera var. maanettii Hort. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena alpina Cronamere ex Moldenke, Alph. List Invalid Names Suppl. 1: 22, in syn. 1947. Verbena mahanettii Hort. ex Moldenke, Résumé 369, in syn. 1959. Verbena tenera maonettii Regel ex T. H. Everett, New Illustr. Encycl. Gard. 13: 2405. 1960. Verbena mahonetti Hort. ex Moldenke, Résumé Suppl. 7: 9, in syn. 1963. Verbena tenera maanetti Hort. ex Moldenke, Résumé Suppl. 7: 10, in syn. 1963.

Bibliography: Regel, Gartenfl. 4: 373, pl. 142, fig. 1. 1855; Planch. & Van Houtte, Fl. des Serres 11 [ser. 2, 1]: 115, pl. 1129. 1856; Vilm., Fl. Pl. Terre, ed. 1, 938. 1865; Morren, Belg. Hort. 20: 111. 1870; Rümpler in Vilm., Illustr. Blumeng., ed. 1, 1261--1262. 1873; Regel, Gartenfl. 28: 372. 1879; Vilm., Album de Clichés, ed. 2, fig. 25675. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Ed. Rodiges, Bull. Arboricult. Belg. 1902: 113 & 114. 1902; P. Henderson, Handb. Pl., new ed., 476. 1910; Cowen & Bailey in L. H. Bailey, Stand. Cycl. Hort. 6: 3445. 1917; Hegi, Illustr. Fl. Mittel-Eur. 5 (3): 2240. 1927; Stapf, Ind. Lond. 6: 431. 1931; L. H. & E. Z. Bailey, Hortus, new rev. ed., 632. 1935; Moldenke, Cult. Pl. 35. 1938; Moldenke, Annot. & Classif. List 108. 1939; Moldenke, Prelim. Alph. List Invalid Names 44 & 47--49. 1940; Moldenke, Saxiflora pl. 16. 1940; Moldenke, Suppl. List Invalid Names 10. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 75 & 102. 1942; Moldenke, Alph. List Invalid Names 44 & 48—51. 1942; Moldenke, Phytologia 2: 75 & 117. 1945; Moldenke, Alph. List Cit. 1: 19, 40, & 195. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 22 & 27. 1947; Moldenke, Castanea 13: 121. 1948; Moldenke, Alph. List Cit. 3: 658, 743, 768, 770, 771, & 904 (1949) and 4: 1104, 1154, 1204, & 1253. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 165 & 199. 1949; Politi, The Garden 2 (4): 22. 1950; Stumpp & Walter, 1950 Gard. Ann. 76. 1950; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209. 1951;

Henderson, Stumpp, & Walter, Everything for Gard. 1952: 78. 1952; Moldenke, Journ. Calif. Hort. Soc. 15: 83. 1954; Mattoon, Pl. Buyers Guide, ed. 6, 287. 1958; Moldenke, Résumé 224, 357, 369, 373, 376, & 474. 1959; T. H. Everett, New Illustr. Encycl. Gard. 13: 2405. 1960; Moldenke, Résumé Suppl. 2: 13 (1960) and 7: 9 & 10. 1963; Moldenke, Phytologia 11: 23 & 25. 1964.

Illustrations: Regel, Gartenfl. 4: 373, pl. 142, fig. 1 [in color]. 1855; Planch. & Van Houtte, Fl. des Serres 11 [ser. 2, 1]: pl. 1129 [in color]. 1856; Morren, Belg. Hort. 20: 111 [in color]. 1870; Rümpler in Vilm., Illustr. Blumeng., ed. 1, 1262. 1873; Regel, Gartenfl. 28: 372. 1879; Vilm., Album de Clichées, ed. 2, fig. 25675. 1888; P. Henderson, Handb. Pl., new ed., 476. 1910; Moldenke, Saxiflora pl. 16. 1940.

This variety differs from the typical form of the species in having its corolla-lobes conspicuously white-rayed and white-margined or only white-margined. The corolla itself varies from pink or rose to violet-rose or reddish-violet.

The variety is apparently of garden origin and is known thus far only from cultivated material. It is, however, to be expected in the wild. It has been collected in anthesis from June to September. Common name for it are "Italian verbena", "Italian vervain", "Mahonet's Verbene", and "vervain". Bailey (1935) states that the seeds are offered to the horticultural trade by Cronamere; Mattoon (1958) says that they are offered by John Forbes (Hawick).

Stumpp & Walter (1950) say "Give an open sunny exposure; protect with a covering of leaves over winter -- pink and white striped flowers on a trailing plant; blooms all summer; 6 in." Henderson, Stumpp, & Walter (1952) state that the plant requires drained soil in sunlight. Everett (1960) comments that "The variety occasionally produces branches bearing flowers of the same color as the ordinary type."

The plants of this variety cultivated at the New York Botanical Garden, specimens from which are cited below, originated in the garden of Clarence Lewis at Stirlington, New York. The specimen preserved as H. Schneider s.n. [N. Y. Bot. Gard. Cult. Pl. R.122/34] in the Britton Herbarium, cited below, was the basis for the illustration in Saxiflora (1940). Here and in my other 1940 publication (see bibliography) I regarded the correct name for this plant as V. pulchella var. maonetti (Regel) Regel, but I have since been convinced that the taxon is more closely related to V. tenera. The reference to Regel, Gartenfl. 4: 373 (1855) is incorrectly cited to volume "6" by Stapf (1931).

Material of this variety has been misidentified and distributed in herbaria as V. pulchella Sweet. On the other hand, the Eastwood s.n. [Huntingdon's Place, Aug. 1915] and Walther 141 & s.n. [Pasadena, June 1921], distributed as V. tenera var. maonetti, are actually V. tenuisecta Briq.

Rümpler (1873) discusses this variety as follows: "Blumen purpurrosa oder carmin, bisweilen rosa-violett, die Lappen der Blu-

enkrone abwechselnd mit weiszen Streifen bezeichnet, die zusammen einen Stern bilden. Man hat von dieser Race auch mehrere Varietäten mit einfarbig zart-rosenrothen, lebhaft-rosenrothen und violett-rosigen Blumen. Wegen ihrer geringen Höhe, ihres raschen Wachsthums und der Dauer ihrer niedlichen Blumen, wie wegen der Eleganz ihrer Beleubung ist diese Verbene zur Bildung von Einfassungen und Teppich-beeten, zur Bepflanzung von Abhängen, Büschungen, Hügeln, wie auch zur Ausstattung der Rabatten höchst werthvoll. Ihre zahlreichen Aeste und Zweige breiten sich in jeder Richtung auf dem Boden aus und wirzeln sich in dem Masse ein, in dem sie sich verlängern, wodurch diefe Pflanze in vielen Fällen sehr nützlich wird.

"Die Varietät Mahoneti ist erst zu Anfang der sechzigen Jahre in der Gärten eingeführt worden; mit ihren zahlreichen, auf farbigen Grunde weiss-gesternten Blumen macht sie einen sehr angenekmem Effekt; sie scheint robuster zu sein und der Trocknisz besser zu widerstehen, als die Stammart. Man bildet aus ihr hoch-elegante Teppichbeete und reizende Topfpflanzen. Man hat jetzt auch eine grosze Anzahl von Farben, von denen mehrere ohne weiszen Stern. Einige dieser Farbenvarietäten der Verbena Mahoneti hat man aus Samen und durch künstliche Befruchtung gewonnen; aber die ersten in den Handel gekommenen Varietäten waren nach einigen Berichten das Resultat zufälliger Farbenwandlung, welche auf einigen Zweigen von Pflanzen, die der Stammform Mahoneti gehören, auftraten und durch Stecklinge fortgepflanzt wurden. Die Stammart bringt gern und selbst reichlich Samen, so dasz man die gewöhnlich als Einjährige behandelt; man säet sie in der Weise, wie bei Nr. 1 [V. canadensis] angegeben. Die Varietät Mahoneti und ihre Untervarietäten dagegen erzeugen sehr selten Samen, weshalb man sie gewöhnlich aus Stecklingen vermehrt, was das ganze Jahr hindurch geschehen kann, aber vorzugsweise im Herbst; die Schalen mit den Stecklingen überwintert man unter Glas. Man kann aber auch im Frühjahr aus Zweigen der unter Glas überwinterten alten Pflanzen Stecklinge im Mistbeet und im Sommer auch wohl im freien Lande machen. Wie elegant und hübsch aber auch diese Varietät ist, so wird sie doch jetzt weit weniger häufig kultivirt, als in früherer Zeit, wahrscheinlich der etwas umständlicheren Vermehrung wegen."

Hegi (1927) regards these plants as representing a multiple hybrid, V. tenera x incisa x erinoides, which, he says, gave rise to "bunte Blumisten Verbenen" and "italienischen Blumisten Verbenen". I discuss this hybrid under xV. trinitensis Moldenke, which is morphologically quite different.

In all, 16 herbarium specimens and 2 mounted illustrations have been examined by me.

Citations: CULTIVATED: California: Eastwood s.n. [San Francisco, July 10, 1915] (Gg--31411); Walther s.n. [Mill Valley, July 24, 1929] (Gg--165704). Connecticut: Bevoise s.n. [Green Farms, Aug. 1934] (Ba). England: L. H. Bailey s.n. [Kew, Aug. 8, 1919] (Ba); Nelmes 1200 (Ba); Stearn s.n. [Moldenke & Moldenke 9216]

(N). Italy: Gresino s.n. [VIII.1928] (N). New York: T. H. Everett s.n. [May 25, 1934] (N); McSweeney s.n. [N. Y. Bot. Gard. Cult. Pl. R.122/34] (N); H. N. Moldenke 8071 (N); Moldenke & Moldenke 11883 (N); New York Bot. Gard. Cult. Pl. 9068 (N--photo); H. Schneider s.n. [N. Y. Bot. Gard. Cult. Pl. R.122/34] (Ba, N); M. Zimmerman 17 (Ba). Pennsylvania: Clausen & Lawrence H.272 [Lew 52736] (Ba), H.399 (Ba). MOUNTED ILLUSTRATIONS: Vilm., Album de Clichées, ed. 2, fig. 25675. 1888 (N).

xVERBENA TENTAMENTA Moldenke, Résumé Suppl. 4: 10, 11, & 18, hyponym (1962), nom. nov.

Synonymy: Glandularia perakii x peruviana Schnack & Covas, Darwiniana 7: 73, in textu. 1945. Verbena perakii (Covas & Schnack) Moldenke x V. peruviana (L.) Britton ex Moldenke, Résumé Suppl. 4: 18, in syn. 1962. Verbena peruviana (L.) Britton x V. perakii (Covas & Schnack) Moldenke, Résumé Suppl. 4: 18, in syn. 1962.

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This is the hybrid between V. perakii (Covas & Schnack) Moldenke and V. peruviana (L.) Britton, with intermediate characters, originally produced artificially by Schnack and Covas from cultivated material in Argentina in 1944. The two parent species grow together naturally in at least two provinces of Argentina, so the hybrid is likely to occur in the wild. It should have considerable horticultural merit.

VERBENA TENUISECTA Briq., Ann. Conserv. & Jard. Bot. Genèv. 7-8: 294—296. 1904.

Synonymy: Verbena dissecta Morong apud Briq., Ann. Conserv. & Jard. Bot. Genèv. 7-8: 294, in syn. 1904 [not V. dissecta Poepp., 1847, nor Schau., 1959, nor Spreng., 1959, nor Walp., 1849, nor Willd., 1825]. Glandularia tenuisecta (Briq.) Small, Man. Southeast. Fl. 1139 & 1508. 1933. Verbena tenera x lanceolata Kellogg ex Moldenke, Carnegie Inst. Wash. Publ. 522: 150, in syn. 1940. Grandularia tenuisecta (Briq.) Small ex Martínez Crovetto & Piccinini, Revist. Invest. Agric. 4: 77, 181, & 225, sphalm. 1951. Verbena ericoides L. ex Roig, Dicc. Bot. 2: 1114. 1953. Verbena arenicola Reade ex Moldenke, Résumé 357, in syn. 1959. Verbena bipinnatifolia Wall. ex Moldenke, Résumé 358, in syn. 1959. Verbena erinoides f. glabrescens Regnell ex Moldenke, Résumé 364, in syn. 1959. Verbena moteana Hort. ex Moldenke, Résumé Suppl. 7: 9, in syn. 1963. Verbena tenuiseta Briq. ex Moldenke, Résumé Suppl. 8: 6, in syn. 1964.

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Annual or perennial herb, varying from prostrate and creeping or semi-creeping to procumbent or decumbent, 10--60 cm. tall, sometimes of upright habit or suffrutescent at the base; stems usually decumbent, branched at the base, spreading and forming mats; branches mostly prostrate, ascending at the tips, divergent or bent, 20--55 cm. long, rooting at the nodes, tetragonal, sparsely pilose with antrorse hairs, becoming glabrescent in age; principal internodes 1.5--3 cm. long; vegetative parts aromatic-resinous; leaves decussate-opposite; leaf-blades triangular in outline, 2--3.5 cm. long, 2--3 cm. wide, green, tripartite-pinnatifid, substrigose above with appressed antrorse hairs, more densely so along the venation beneath, becoming glabrescent, the segments or laciniations all uniformly linear or narrowly linear, 1--3 mm. long, entire or dentate, mostly less than 1 mm. wide, obtuse (especially on the lower leaves) or sharply acute (especially on the upper leaves) at the apex, flat except for the revolute margins; inflorescence terminal, spicate, showy; spikes pedunculate, solitary, fastigiate, dense and short during anthesis, about 1.5 cm. long, ovate-capitate, later elongating to 4 or more cm.; flowers resinous-odorous, sessile, at first dense and ascending, later lax and spreading; bractlets subovate-lanceolate, 2--3 mm. long, usually about 1/4 as long as the calyx, canescent-puberulent on the back; calyx long-tubular, 8--9 mm. long, densely strigose or substrigose-canescent throughout, with a few scattered black glands, its tube about 7 mm. long, the teeth ovate, 1--2 mm. long, filiform-setulose at the apex; corolla hypocrateriform, showy, varying from blue, bluish, blue-violet, blue-lilac, deep-blue, bluish-purple, or purplish-blue to purple, light-purple, deep-purple, violet-purple, pink-purple, bright pink-purple, reddish-purple, magenta-purple, rose-purple, and brilliant rose-purple, or pink, rose, lilac, light rose-lilac, bright rose-lilac, dark-lilac, purple-lilac, vivid-rose, violet, light-violet, pale-violet, lavender, deep-lavender, magenta, mauve, or Parma violet-mauve, often purple with a minute white eye, drying blue, its tube glabrous, exserted 3--5 mm. from the mouth of the calyx, its limb about 10 mm. wide, the lobes broadly obcordate, spreading, 3--4 mm. long, 3--4 mm. wide above the middle, emarginate to 1--1.5 mm. at the apex, ciliate-pilose at the base within; stamens included; anther-connectives appendaged, the appendages glandular, scarcely exserted; style included, 1--1.3 cm. long, surpassing the calyx, lasting one day; schizocarp oblong-linear, yellowish, 3--3.5 mm.

long, prominently reticulate-nervose or -scrobiculate above the middle; chromosome number: 2n = 10.

The type of this handsome species was collected by Benedict Balansa (no. 1025) along roadsides at La Trinidad, Paraguay, on October 4, 1875, and is deposited in the herbarium of the Conservatoire et Jardin Botaniques at Geneva. The species is also published as though new in Chod. & Hassler, Bull. Herb. Boiss. 2 (4): 1059 (1904), where several specimens are cited, including Hassler 6144 [photographed by Macbride in the Berlin herbarium as his type photograph no. 16451, the specimen now destroyed], which is sometimes referred to as a cotype. The Index Kewensis, however, maintains the Ann. Conserv. & Jard. Bot. Genèv. publication as the original one and there Balansa 1025 only is cited; I therefore regard this collection as the actual type. The type of V. tenera x lanceolata was collected by John Henry Kellogg at the Missouri Botanical Garden in St. Louis, Missouri, on August 25, 1911, and is deposited in the United States National Herbarium at Washington; that of V. erinoides f. glabrescens is Herb. Regnell s.n. [Hort. Bergiano, 8/1897] deposited in the herbarium of the Naturhistoriska Riksmuseum at Stockholm; that of V. arenicola was collected by John Moore Reade in Muscogee County, Georgia, on April 3, 1930, and is deposited in the herbarium of the University of Georgia; and that of V. moteana is Secondaire 6917 from Spain, deposited in the University of Lund.

Verbena tenuisecta resembles V. tenera Spreng., but the latter differs in having its bractlets about one-half (instead of only one-quarter) as long as the calyx, densely long-ciliate on the margins, and in having short and spreading often hirsutulous pubescence on the calyx-tube (instead of closely appressed-strigose). Further studies may show that Briquet's name may have to be supplanted by one of several older names for South American plants which may possibly prove to be conspecific with this taxon, as, for instance, V. aristigera S. Moore or V. mendocina R. A. Phil., both of which I am at present regarding as distinct taxa.

The species is native to and widely distributed in Brazil, Uruguay, Paraguay, Argentina, Bolivia, and Peru, and has been introduced into many other parts of the world. It was apparently introduced into cultivation in 1837 and is now widely cultivated in the United States. It has become naturalized there from North Carolina, Tennessee, and Arkansas south to Florida and west to Arizona and California, as well as in Quebec, forming a showy and welcome addition to the roadside flora. It is listed by Mohr (1901) as V. tenera Spreng. and by Perry (1933) and Cory (1937) as V. erinoides Lam. -- a name also widely used for it by horticulturists and gardeners. Cory cites it from the Rio Grande plains of Texas. It is one of the parents of the Teas Verbena (xV. teasii Moldenke) developed by Edward Teas at Houston, Texas, and now widely cultivated — the other parent being xV. hybrida Voss.

Verbena tenuisecta inhabits sandy or dry sandy soil, clayey soil, dry sunny soil, and sandy clay or sandy loam, and is found along roadsides, dry or sandy roadsides, highways, sidewalks, railroad rights-of-way, streets, waysides, and grassy roadsides in pine forests, as well as the margins of wooded streams. It has been collected at the edges of woods, in wet or ridge thickets, ditches and wet roadside ditches, sandy or waste places, open or grassy fields, dry fields and wastelands, pine forests and pine-oak woodlands, campos and low campos, sandy campos near rivers, gardens and waste ground, cultivated land and grassy places, shrubbery and open woodlands, pinelands and high rocky places, canyons, open grassy pastures of bayou margins, and in sand near the coast. Collectors have found it on river-bottoms and river flats, grassy road shoulders and highway shoulders, riverbanks and dry open sandy riverbanks, sandy clay banks and ditch banks, dunes, barrancas, steppes, and stream margins, rocky slopes and rocky hillsides, sandy roadsides, sandhills, and sandy rocky campos. It is found in dry places, sandy roadfill in stream bottoms, and gumbo glades (local prairie on tight marly substratum completely surrounded by pinewoods on sand). It has been found at altitudes of 16 to 2900 meters, blooming and fruiting in every month of the year.

In eastern Texas it is said to inhabit roadsides, fields, and waste places as an introduction, blooming from March to August, from Sabine to Orange and south to Victoria Counties. O'Neill says of it "rare along railroad tracks" in Florida, while McFarlin found it in waste places near an old phosphate bed in that state. Davis & Davis report that it "covers large areas of sandy roadside in Florida and Georgia". In the latter state Manning found it "surrounded by grass and sedge", Taylor found it "with woodsorrel, dogwood, and evening-primrose", Owens "in sandy soil among toadflax", and the Baileys say that it is "abundant" on roadsides. In Mississippi it is described by Lemaire as "common along highway", by Ray as "locally abundant along grassy roadside", by Cooley & Pease as "abundant", and by Demaree as "common in sandy areas near the coast". In South Carolina Bell found it in pine woodland with exposed granite and in sandy wooded crossroads cemetery, while Ahles & Bell call it a "weed along sidewalk". Ware encountered it in Louisiana in open post oak-blackjack oak-Pinus echinata woods on heavy reddish-brown clay soil with scattered prairie plants in open places, growing with Schizachyrium scoparium, Tithymalopsis corollata, Pycnanthemum, Callirhoe, Petalostemon, and Asclepias, and Ewan calls it "frequent" there. In North Carolina it is said by Wilbur to be "occasional along weedy border of fields". Mohr (1901) says that it is "fugitive on ballast [Mobile County, Alabama], flowers deep-blue, 1893--95; low creeping, the suffruticose stems 1 to 2 feet long." Wagenknecht reports it as a "common weed covering large areas along shoulders of roadsides in dry and sandy soils" in Florida.

Cory found it "frequent along streets" in Texas and notes "likely introduced by State Highway Department". In the same state it

was found by Trew in "open upland area in sandy loam soil", while Traverse says "perennial herb 20--40 cm. tall, procumbent in snarled mass in grass, upright at ends, in much disturbed stream bottom, buff sand in Pinus taeda-Quercus nigra complex" and "on downtown streets, in cracks in concrete in sidewalk and edge of parking lot in brown very slightly clayey sand with Sonchus, Gnaphalium, and grasses". Spalding found it growing as a "waif along street" in California, and C. F. Smith says of it in that state "planted but weedy, apparently many colonies or plants are spontaneous". Ekman H.12615 bears a notation on its label that the species is "cultivated and escaped" in the Dominican Republic. In Trinidad it is said by Broadway to be "cultivated largely as an ornamental object; of scandent habit; always flowering; blossoms either purplish or white." Garnier reports that in Nicaragua it is "cultivated in high elevations".

Montes states that the plant is "rare on high dry rocky campos" in Misiones, Argentina; Eyerdam, Beetle, & Grondona report it in "large clumps sometimes abundant over wide areas in semi-open fields, low sandy rolling hills, in shrub formation" in Buenos Aires; Lefebre found it "very common in fields" in the same province; while Jürgensen reports it "common on campo" at Villarica, "common" at Las Palmas, and "abundant" at Formosa in Paraguay. Martínez Crovetto & Piccinini (1950) say of it "Hemicriptófita radicante con flores lilacinas, frecuente en la región. Crece también en los palmares, pero en ellos es más bien rara" and cite their no. 5527 from Corrientes, Argentina.

Baker avers that in Egypt it "likes damp places", while Meeuse says of it in the Transvaal "roadsides and spontaneous in gardens" and "wasteland in town, introduced, escaped, and spreading through Transvaal". Singh 163 bears a notation that in India it is "also cultivated". In Queensland it was encountered by Jones "in yellow sand, loose surface, weeds on footpath and vacant allotment". Thorne (1954) describes the species as inhabiting "roadsides, pastures, waste places, and dry, open woods, abundant"; Sandeman found it in "full exposure and semi-shade"; Hatschbach found it "between Iridaceae and Portulacaceae in rocky land." L. H. Bailey's specimen from Glen St. Mary, Florida, is labeled "wild, said to be native".

The H. J. Banker 3685 collection is a mixture with something geraniaceous or malvaceous. D. S. Correll 15325 is a mixture with var. alba. Rambo says "in rupestribus parce humosis prostrata" and "pulcherrima species!" Bailey & Bailey 1856 bears a notation by Dr. Bailey "probably not cultivated", but of E. E. Barker s.n. he says "a common and favorite garden flower [in Puerto Rico]; winged below anther".

Perry (1933) speaks of this plant as "Verbena erinoides Lam." and says "This species has established itself in several places. It belongs to a South American species-complex needing critical study to determine accurately its real identity". She cites no specimens. Most of the records of "V. erinoides" in botanical and

horticultural literature, including those of Junell (1934), probably refer to V. tenuisecta rather than to V. laciniata where this name belongs. In most of my previous publications I regarded "V. crinoides Lam." as a synonym of V. tenuisecta, but it is obviously only a misspelling of V. erinoides Lam. and so must go wherever that name goes (viz., to V. laciniata).

Neal (1948) calls our plant V. pulchella and gives the names V. erinoides and V. tenera as synonyms, but, upon examination, her plants have all proved to be V. tenuisecta. I have personally observed the species in cultivation in Hawaii. Hieronymus says "Nach Grisebach von V. tenera Spreng. verschieden und zu V. erinoides als Varietät gehörigm scheint eigene gute Species." Eggleston 5104 in the Britton Herbarium has a slide mounted on the sheet.

Bailey (1935) says that seeds of what he calls "V. erinoides" are available from Breck, Buist, Burnett, Cherry Meadow Gardens [Framingham Center, Mass.], Dreer, Hunt, Hyde, Kew, Michell, Muller-Seely, Schling, Stumpp & Walter, Trivetts, Vilmorin, and Waterer. The seeds of N. Y. Bot. Gard. Cult. Pl. 22428 originated in Madrid. Seeds of L. H. Bailey s.n. [July 19, 1924] and s. n. [Aug. 10, 1924] were obtained by him from Vilmorin-Andrieux & Cie., Paris, as their no. 80067, were sown by him on April 18, and represent the variety "Violette"; those of his s.n. [July 23, 1925] and s.n. [Aug. 7, 1925] from Haage & Schmidt, Erfurt, as their no. 5199, were sown by him on April 7, the August 7 collection containing a seed packet on the sheet. Burdick 24 represents the variety "Rouen". Teas s.n. [Houston, June 1926] is labeled "the true V. erinoides", which it isn't! The H. H. Bartlett 19862, cited below from Uruguay, has "provincia Santiago del Estero" also on its label, so may actually come from that province of Argentina. L. H. Bailey 7737 and Burdick 24 bear this notation on their labels [appendage below anther" and H. H. Hume s.n. [June 1920] "wing below anther", in both cases signed by "LHB" [Liberty Hyde Bailey].

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BOOK REVIEWS

Alma L. Moldenke

"Quantitative Plant Ecology", by P. Greig-Smith, ed. 2, xii + 256 pp., illustr. Butterworths, Washington, D. C. 1964. $8.95

This new edition assesses the field of plant ecology with even more of the precise tools of the quantitative or statistical approach which is now assisting and/or overtaking the qualitative or descriptive approach. The main topics covered in this fine text are: quantitative description of vegetation, sampling and comparison, pattern, association between species, correlation of vegeta-

tion with habitat factors, description and comparison of plant communities, and then classification and ordination of plant communities, and the quantitative approach of plant ecology.

The most valuable feature of the book is the analysis given therein of plant communities.

Appendices give useful meteorological and species spread data, pertinent mathematical tables, excellent references, author index, and a subject index which lacks generic names.

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"The Royal Botanic Garden, Edinburgh", anon., 80 pp., illustr. Her Majesty's Stationery Office, London, or British Information Services, New York 22, New York. 1964. 80 cents or 4 sh.

This is an attractive booklet describing the individual gardens in this beautifully kept complex. It is written in the typical style of the British Isles and it is illustrated with several lovely black and white prints.

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"Photosynthetic Mechanisms of Green Plants", edited by Bessel Kok, ix + 766 pp., illustr., Publication 1145 of the National Academy of Sciences. National Research Council, Washington, D. C. 1963. $12.00

By photo-offset more than 70 papers, presented at a symposium sponsored by the Committee on Photobiology with the support of the National Science Foundation, are here made available to students and scholars in this field. These papers represent the immediate efforts of the outstanding leaders in the field and are considered under the following topics: spectroscopic and fluorescence analysis of oxidation-reduction catalysts, biochemical investigations associated with electron transport paths, studies with isolated electron carriers, gas exchanges in enhancement studies, respiration and hydrogen metabolism, functions of pigments and pigment complexes, chloroplast structure and molecular orientation, mechanism of phosphorylation, the carbon path, and a few other topics.

A valuable summary emphasizes the orientation of these papers upon the problems of the electron transport systems of the two distinct light reactions. They are the long wave one sensitized mainly by chlorophyll a and the accessory pigment one.

The National Science Foundation is to be congratulated for making these studies in this important field so readily available to interested scholars and students.

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GRASSES NEW TO THE FLORA OF MARYLAND, DELAWARE AND VIRGINIA

Clyde F. Reed [1]

The following species of grasses are new to the floras of Maryland, Delaware or Virginia. Their presence in these states greatly extends their known distribution in eastern United States.

1. Eragrostis oxylepis (Torr.) Torr. Sandy wastes at Fort Monroe, Hampton, Elizabeth City County, Virginia. Nov. 15, 1959. C.F.Reed 45919 (US). Planted as a turf on sandy soil. This is a northern extension for this species. Hitchcock & Chase [2] (p. 145): sandy soil, southern California to Colorado, Kansas, Arkansas, Tennessee, Alabama and Florida; in eastern Mexico south to Vera Cruz.

2. Festuca dertonensis (All.) Aschers. & Graebn. Edge of woods just east of Noxentown, New Castle County, Delaware. June 13, 1960. C.F. Reed 47196. New to eastern United States and an extension northeastward. Hitchcock & Chase [2] (pp. 62-63, map): native of Europe; British Columbia to southern California, Arizona and Texas; rare as a waif in the eastern United States, only station in eastern Virginia shown on map.

3. Alopecurus aequalis Sobol. On pumice piles (from island off Italy), in Canton, Baltimore, Maryland. May 29, 1964. C.F. Reed 68198. Hitchcock & Chase [2] (p. 359): Eurasia; Greenland to Alaska, south to New Jersey, Pennsylvania, Ohio, Indiana, Illinois, Missouri, Kansas, New Mexico, Arizona and California. In water and wet places. This record in Maryland is an extension southeastward.

The following is an additional record for Bromus tectorum Linn. on the mineral piles at Canton. (See Reed, Phytologia, 10(5): 354. 1964).

4. Bromus tectorum Linn. On pumice piles (from island off Italy), in Canton, Baltimore, Maryland. May 29, 1964. C.F. Reed 68199.

I wish to thank Dr. Jason Swallen, United States National Herbarium, for identifying these specimens.

1/ Botanist, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Maryland.

2/ Manual of the Grasses of the United States, Musc. Publ. No.200, U.S.D.A. 1950.

MATERIALS TOWARD A MONOGRAPH OF THE GENUS VERBENA. XXVII

Harold N. Moldenke

VERBENA TENUISECTA Briq.

Additional bibliography: Moldenke, Phytologia 11: 181 (1964) and 11: 243, 246, 265, 268, 270—274, 278, & 280—287. 1965.

It should be noted here that the V. dissecta of Poeppig and of Walpers is V. sulphurea D. Don; that of Schauer is V. berterii (Meisn.) Schau.; that of Sprengel is V. dissecta Willd., a valid species.

Ten hybrids involving V. tenuisecta are known — that with V. canadensis (L.) Britton is known as xV. wingei Moldenke, with V. dissecta Willd. is xV. nequam Moldenke, with xV. hybrida Voss is xV. teasii Moldenke, with V. incisa Hook. is xV. trinitensis Moldenke, with V. megapotamica Spreng. is xV. transitoria Moldenke, with V. perakii (Covas & Schnack) Moldenke is xV. nisa Moldenke, with V. peruviana (L.) Britton is xV. solbrigii Moldenke, with V. phlogiflora Cham. is xV. dissoluta Moldenke, with V. racemosa Eggert is xV. kondai Moldenke, and with V. santiaguensis (Covas & Schnack) Moldenke is xV. covasii Moldenke. The so-called "Verbena chamaedryfolia x tenuisecta" Briq., however, is V. calliantha Briq.

Common and vernacular names recorded for V. tenuisecta include "amor de hombre", "amór de hombre", "camaradinha", "common moss vervain", "formosa sem dote", "fumaria", "hierba del incordio", "jurupeba", "lazo de amor", "margarita", "margarita morada", "moss verbena", "perajil", "Rouen", "sandialahuén", "sandia lahuen", "small-flowered verbena", "verbena", "verbena americana", "verbena azul", "verbenna", "vervain", "verveine élégante", "verveine erinoides Violette", "wild verbena", "yerba del incordio", and "yerba meona".

Material of V. tenuisecta has been misidentified and distributed in herbaria under such names as V. ambrosiaefolia Rydb., V. aristigera S. Moore, V. aubletia L., V. bipinnatifida Nutt., V. bipinnatifidum Nutt., V. canadensis (L.) Britton, V. dissecta Willd., V. drummondii (Lindl.) Bart., V. drummondii (Lindl.) Baxt., V. erinoides Lam., V. erinoides var. laciniata (L.) Briq., V. glandularia Jörgensen, V. incisa Hook., V. mahanettii Hort., V. mendocina R. A. Phil., V. microphylla H.B.K., V. officinalis L., V. pulchella Sweet, V. pumila Rydb., V. tampensis Nash, V. tenera Spreng., V. tenera var. maonetti Regel, V. tenera var. maonettii Hort., Verbenna drummondii Baxt., Linaria sp., and Phlox sp.

On the other hand, the Boffa 25, Herter 181 1/2, and H. M. Smith 5 & 140, distributed as V. tenuisecta, are actually V. tenera Spreng., while Ahles 54307a and Davis & Davis 11624 are V. tenuisecta var.

alba Moldenke.

Briquet (1904) gives the following distinguishing notes about V. tenuisecta: "Cette élégante espèce est voisine des V. tenera Spreng. et V. dissecta Willd. Elle se distingue du V. tenera par son port plus robuste: ses feuilles plus grandes, plus divisées, à divisions plus étroites: son calice plus long, entièrement canescent (et non pas poilu-cilie sur les nervures, glabrescent sur les champs interneuraux), à dents plus longues: ses bractées finement pubescentes extérieurement et très longuement ciliées sur les marges. -- Elle se sépare encore plus facilement du V. dissecta par l'inflorescence qui dans cette derniere espèce, est formée de capitules rassenblés en panicule. En outre, le V. dissecta ne possède pas un calice strigoso-canescent, mais il est pourvu, sur les cotes seulement, de poils recourvés vers le sommet, tandis que les champs interneuraux sont glabres ou presque glabres. D'ailleurs, la forme des dents calicinales et l'ampleur des divisions foliaires lui donnent un caractère assez différent. Le V. dissecta de M. Morong (l. c. exsicc. n. 219) appartient exactement au V. tenuisecta et n'a pas de rapports étroits avec le V. dissecta Spreng."

Vilmorin-Andrieux gives these culture suggestions: "Semer: 1° en août-septembre, en pépinière, en pots ou en terrines; repiquer en pots; hiverner sous chassis ou en serre tempérée au plus près de la lumiere; mettre en place en fin avril-mai. -- 2° en mart-avril sur couche; repiquer en pépinière ou en pots, sur couche, mettre en place en mai. -- 3° en avril-mai en place ou en pépinière. Fl. de juin-juillet en octobre." In the New York Herald Tribune (1952) the following is said: "Most gardeners have learned from experience that few annuals fit perfectly into the rock garden. Most of those that like the specific conditions must be sown every spring, unless the seedlings can be transferred to the rock garden from a special seedbed or the cold frame. However, there is one annual that does better there than anywhere else. It is Verbena erinoides. Once sown the gardener will find new plants coming up year after year if the plants are permitted to seed. It usually is late May or early June before the seedlings show up, which is an advantage because at that time the spring bloomers have finished. Verbena erinoides blooms continuously until frost and the bright blue flowers are a real asset at a time when rock garden flowers are scarce."

Collector differ greatly in their description of the flower-color of V. tenuisecta. Possibly several genuine color-forms are represented, but more probably the apparent differences are due to differing color interpretations on the part of the collectors and to the age of the flowers observed. They are described most often as "purple", as on R. M. Aguilar 843, Barrionuevo s.n., Chrysler & Johnson 350, Dress, Moore, & Lawrence 633, Eyerdam, Beetle, & Grondona 3443, Greco s.n., J. Gutiérrez 89, C. L. Lundell 10937, Lundell & Lundell 10550, Peredo s.n., Ruiz Huidobro

3147, Sota 24, Stratton 6125, and Tharp, Turner, & Johnston 54849, or as "violet", as on Arechavaleta 23, L. H. Bailey s.n. [July 19, 1924], Berro 133, 2991, 6022, & 7225, Grüner 378, Ibarrola 3218, Jörgensen 3771, Osten 8064, 9013, & 13107, Pancho 1669, Rojas 2536, Ruiz Huidobro 3359, 3637, & 5417, G. J. Schwarz 1885, 2260, 2502, 3040 (in part), 3086, & 3232, Traverse 981 & 1383, and Valeur 448. They are called "deep-purple" on Lundell & Lundell 10511, "pink-purple to bluish-purple" on Cronquist 4875; "violet-purple" on L. H. Bailey s.n. [Aug. 4, 1922] and J. West 8470; "brilliant rose-purple" on L. H. Bailey s.n. [Aug. 7, 1925]; "purple with a minute white eye" on Lundell & Lundell 11065; "purple-lilac" on Montes 1825; "bluish-purple" on R. M. Aguilar 409; "purplish-blue" on Montes 2278; "bright pink-purple" on Cronquist 4953; "bright-purple" on Janish & Janish 264; "magenta-purple" on Shinners 14012; "rose-purple" on B. E. Smith 1459; "bluish to reddish-purple" on Shinners 25811; "lilac" on Bailey & Bailey 257, Bertoni 1970, Britton, Britton, & Boynton 8712, Cabrera 12360, Ruiz Leal 14887, and Terribile 633 & 671; "bright rose-lilac" on L. H. Bailey s.n. [Aug. 10, 1924]; "lilac to pale-violet" on Herter 50887; "dark-lilac" on Ruiz Leal 14891; "blue-lilac" on Wall & Sparre s.n.; "pale-violet" on Arechavaleta 23 bis; "violet, drying blue" on C. F. Smith 2403; "Parma violet mauve" on Sandeman 4824; "light-violet" on Ekman H.12615; "blue-violet" on Wall & Sparre s.n.; "rose" on Ruiz Leal 14247, D. Rodriguez 578, and G. J. Schwarz 1177 & 1251; "vivid-rose" on Jörgensen 2465; "pink" on Correll, Johnston, & Edwin 22229; "magenta" on Craig & Craig 3392; "mauve turning blue in drying" on Meeuse 9143; "lavender" on Correll, Johnston, & Edwin 22258; "deep-lavender" on D. S. Correll 15325; "blue" on Cabrera 3244, Ibarrola 1283, T. Meyer 139 & 11339, H. N. Moldenke 1083, 1084a, & 18237, Montes 1079, Ruiz Huidobro 3742 & 3769, and Singh 163; and "deep-blue" on R. Jones 102, while on Gillespie 365 the flowers are described as "deep-blue to purple, exterior part of corolla white between flange and tube of corolla."

For those students interested in plotting the spread of the species as an introduction I give herewith the earliest dates known to me at present of its having been collected in various areas: North Carolina: Columbus, Cumberland, Duplin, Hope, Robeson, & Scotland Counties -- 1958. South Carolina: Lexington County -- 1936; Charleston County -- 1941; Dillon County -- 1949; Allendale, Bamberg, Barnwell, Florence, Kershaw, Lee, Orangeburg, & Richland Counties -- 1962. Georgia: Clarke & Dougherty Counties -- 1909; Toombs County -- 1914; Tift County -- 1926; Bibb & Turner Counties -- 1929; Colquitt & Muscogee Counties -- 1930; Mitchell County -- 1933; Crisp County -- 1937; Ware County -- 1940; Baker, Clinch, & Echols Counties -- 1941; Ben Hill County -- 1946; Effingham & Laurens Counties -- 1947; Tatnall County -- 1948; Bacon, Bleckley, Brooks,

Burke, Decatur, Dodge, Grady, Hancock, Jeff Davis, Jefferson, Lanier, Lowndes, Screven, Telfair, Thomas, Twiggs, & Washington Counties -- 1962. Florida: Baker County -- 1918; Dade & Marion Counties -- 1921; Alachua & Gulf Counties -- 1924; Gadsden County -- 1925; Bay & Jackson Counties -- 1926; Leon County -- 1936; Washington County -- 1937; Franklin County -- 1939; Hamilton County -- 1940; Holmes County -- 1954; Calhoun & Liberty Counties -- 1962. Alabama: Mobile County -- 1893; Etowah County -- 1918; Autauga County -- 1927; Butler County -- 1931; Escambia County -- 1932. Mississippi: Harrison County -- 1925; Scott County -- 1927; Pearl River County -- 1940; Jones County -- 1955. Arkansas: Calhoun County -- 1941. Louisiana: Orleans Parish -- 1932; Lincoln Parish -- 1950; Natchitoches Parish -- 1956; Beauregard, Bienville, Bossier, Claiborne, Jackson, Vernon, & Webster Parishes -- 1963. Texas: Harris County -- 1920; Orange County -- 1931; Jefferson County -- 1934; Newton County -- 1939; Polk County -- 1940; Jasper County -- 1941; Angelina & Galveston Counties -- 1942; Nacogdoches County -- 1944; Hardin County -- 1947; Trinity & Waller Counties -- 1948; Sabine County -- 1959. Arizona: Pima County -- 1949. California: Los Angeles County -- 1924; Ventura County -- 1944; Santa Barbara County -- 1950. Puerto Rico -- 1914. Dominican Republic -- 1929.

Troncoso (1937) reports that the species is cultivated in Buenos Aires. Briquet (1904) cites Regnell A.3643. Martínez Crovetto & Piccinini (1951) cite Martínez-Crovetto 5527 from Corrientes and describe the species as "Hemicriptófita radicante con flores lilacinas, frecuente en la región. Crece también en los palmares, pero en ellos es más bien rara." Hoehne (1951) refers to "Moldenke, in 'Misc. Papers', vol. XVII (1940) p. 150 e 'Flora Brasílica', vol. 47: 4, 1, inédito." Ahles & Radford (1959) cite Correll & Blomquist 7341 (H) from Columbus County, North Carolina, and Wilbur 5748 (H) from Scotland County. They also cite Ahles & Hammond 24460 & 24790, Ahles & Ramseur 23705 & 24010, and Ahles & Neuber 25065 as Ahles numbers. They comment that "Small (1933).....gives the range of this species as 'Fla. and Ga. to La.' Moldenke (1949) excludes this species from North Carolina. Fernald (1950) does not include this species. Moldenke (1952) says, 'naturalized from S. C. to Fla. and w. to Mo., Ark., La., Tex. and s. Cal.' In southeastern North Carolina it is becoming very common on the sandy soil of the coastal plain and its showy blossoms are a welcome addition on the weedy roadsides."

In all, 731 herbarium specimens, including the type collections of all the names involved, and 2 mounted photographs have been examined by me.

Citations: QUEBEC: Laprairie Co.: Cléonique-Joseph 4559 (Vi). NORTH CAROLINA: Columbus Co.: C. R. Bell 12733 (Hi--110656, St); A. R. Moldenke 458 (Fg). Cumberland Co.: Ahles & Hammond 24460 (Hi--104403). Duplin Co.: Ahles & Ramseur 24010 (Hi--104402). Hoke Co.: Ahles & Neuber 25065 (Hi--104401). Robeson Co.: Ahles & Ramseur 23705 (Hi--101632); Britt 2281 (Hi--180051). Scotland Co.:

Ahles & Hammond 24790 (Hi—104400). SOUTH CAROLINA: Allendale Co.: C. R. Bell 2614 (Hi—101646); A. R. Moldenke 419 (Fg). Bamberg Co.: Ahles & Haesloop 22108 (Hi—146192); A. R. Moldenke 428 (Fg). Barnwell Co.: A. R. Moldenke 423 (Fg). Berkeley Co.: Ahles & Haesloop 22374 (Hi—101645). Calhoun Co.: Ahles & Bell 10104 (Hi—92869). Charleston Co.: Vanderbilt s.n. [April 10, 1941] (N). Chesterfield Co.: A. E. Radford 12458 (Hi—92871). Clarendon Co.: A. E. Radford 21219 (Hi—101643). Darlington Co.: B. E. Smith 1459 (Hi—26479), 1460 (Hi—26478), 1461 (Hi—26480). Dillon Co.: Ahles & Ramseur 23307 (Hi—101629); Godfrey SC.49027 (N). Dorchester Co.: Ahles & Haesloop 21836 (Hi—146193). Edgefield Co.: A. E. Radford 20371 (Hi—101644). Florence Co.: C. R. Bell 7541 (Hi—101642); A. R. Moldenke 447 (Fg). Georgetown Co.: A. E. Radford 21587 (Hi—101641). Hampton Co.: Ahles & Bell 10592 (Hi—92870). Horry Co.: C. R. Bell 6269 (Hi—101640). Jasper Co.: Ahles & Bell 10443 (Hi—92826). Kershaw Co.: A. R. Moldenke 444 (Fg); A. E. Radford 23704 (Hi—101639). Laurens Co.: C. R. Bell 5561 (Hi—101636). Lee Co.: A. R. Moldenke 437 (Fg); A. E. Radford 20692 (Hi—101638). Lexington Co.: A. R. Moldenke 432 (Fg); A. E. Radford 20425 (Hi—101637); W. H. Rhoades s.n. [Leesville, Aug. 1936] (Bt—61224, N). Marion Co.: C. R. Bell 6322 (Hi—101635). Marlboro Co.: A. E. Radford 12560 (Hi—92827). Newberry Co.: C. R. Bell 9116 (Hi—101634). Orangeburg Co.: Ahles & Haesloop 21500 (Hi—101633); A. R. Moldenke 431 (Fg). Richland Co.: C. R. Bell 16492 (Hi—201129); A. R. Moldenke 440 (Fg). Saluda Co.: A. E. Radford 20654 (Hi—101631). Sumter Co.: O. M. Freeman 56806 (Hi—92828); Holdaway 1 (H—42680). Williamsburg Co.: A. E. Radford 21434 (Hi—101630). GEORGIA: Appling Co.: Pancho 1669 (Ba). Bacon Co.: A. R. Moldenke 345 (Fg). Baker Co.: W. H. Duncan 4077 (N). Barrow Co.: Welch 1438 (Dp). Ben Hill Co.: Esselbaugh s.n. [Fitzgerald, March 23, 1946] (Ur); F. J. Hermann 10104 (N); W. H. Rhoades s.n. [Fitzgerald] (Hs). Bibb Co.: A. R. Moldenke 370 (Fg); W. H. Rhoades s.n. [near Macon, July 1929; H. N. Moldenke 17085] (Bt, N, St). Brooks Co.: D. S. Correll 5549 (Dm, Dp, H—40234); A. R. Moldenke 309 (Fg, Fg). Bleckley Co.: A. R. Moldenke 377 (Fg). Bulloch Co.: A. Baker 20 (Hi—186571); H. Manning 33 (Hi—198332); C. Owens 26 (Hi—186382); Pyron & McVaugh 1364 (Gu—14064); S. Taylor 27 (Hi—198297). Burke Co.: A. R. Moldenke 407 (Fg). Clarke Co.: Eggleston 5104 (N). Clinch Co.: A. R. Moldenke 330 (Fg); P. O. Schallert s.n. [4/29/41] (Du—369013). Colquitt Co.: Kirkpatrick s.n. [Doe Run, 8-14-30] (Ga). Crisp Co.: H. H. Hume s.n. [Cordele, 13 May 1937] (Fl—26626). Decatur Co.: A. R. Moldenke 296 (Fg). Dodge Co.: A. R. Moldenke 365 (Fg). Dougherty Co.: Eggleston 5104 (Cm, Vt, W—586011); Oosting 80 (Bt—

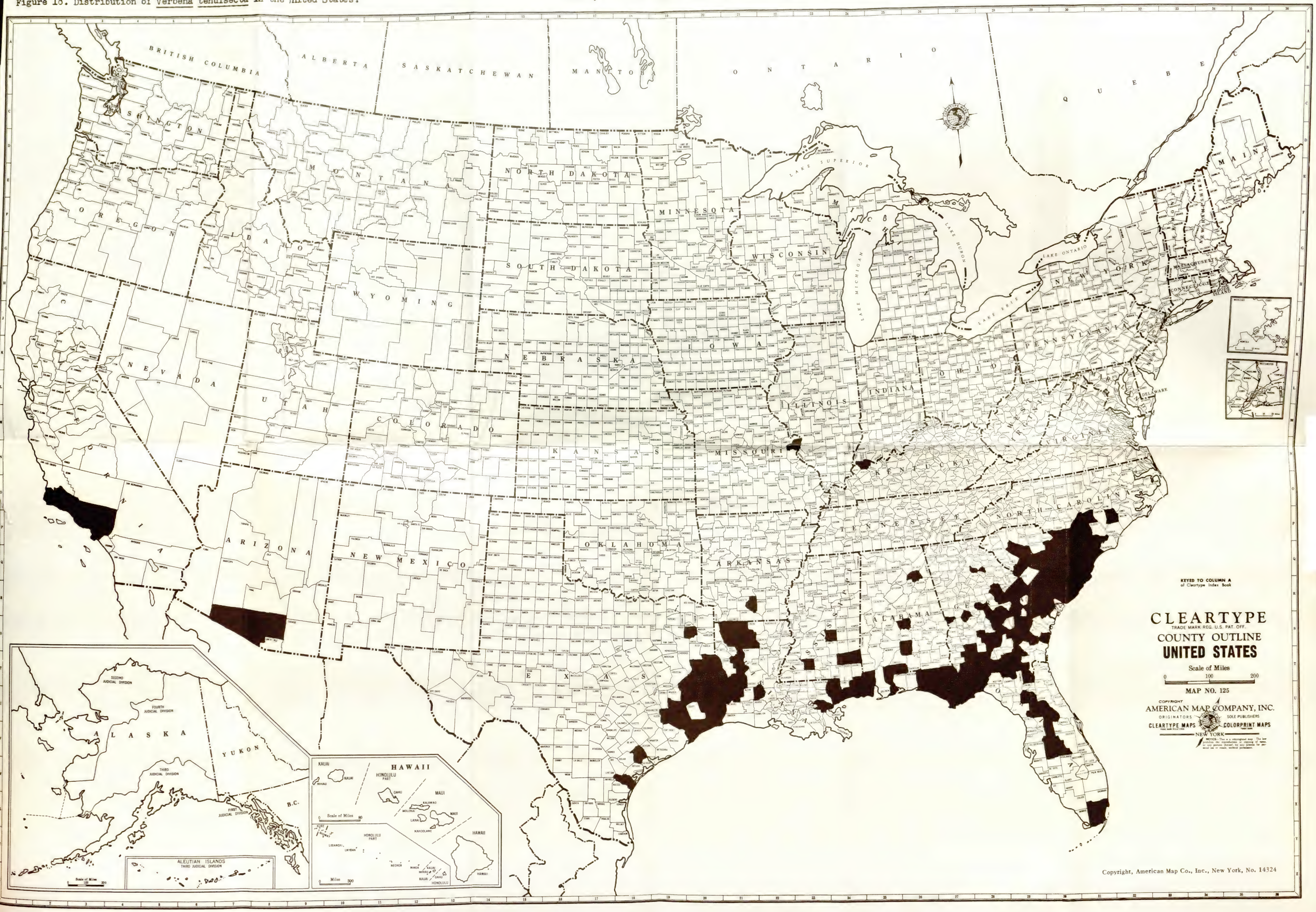
355281, H--1255, Up). Echols Co.: P. O. Schallert s.n. [4/29/41] (Ca--882635, Gg--310859). Effingham Co.: Cronquist 4289 (Gu--28157, N). Emanuel Co.: Craig & Craig 3392 (Po--249594). Evans Co.: Miller & Maguire 1255 (Ua--16571). Grady Co.: A. R. Moldenke 299 (Fg). Hancock Co.: A. R. Moldenke 392 (Fg). Irwin Co.: Pyron & McVaugh 2118 (Gu--16575). Jeff Davis Co.: A. R. Moldenke 353 (Fg). Jefferson Co.: A. R. Moldenke 400 (Fg). Lanier Co.: D. E. Eyles 5702 (Sa); A. R. Moldenke 324 (Fg). Laurens Co.: Cronquist 4875 (Ca--788971, Gu--27814, N, Tl, W--1927215). Lowndes Co.: A. R. Moldenke 315 (Fg). McIntosh Co.: Chrysler & Johnson 350 (Hp, Ru). Mitchell Co.: Bailey & Bailey s.n. [Camilla, Mar. 29, 1933] (Ba). Muscogee Co.: S. F. Evans E.4270 (Up); J. M. Reade s.n. [April 3, 1930] (Gu--E.4270). Richmond Co.: Duke 601 (Hi--112977). Screven Co.: Ahles 54307 (Hi--200786); W. H. Duncan 1241 (Gu--18203); A. R. Moldenke 412 (Fg). Tatnall Co.: Cronquist 4953 (Gu--30565, N, W--1928907). Taylor Co.: Dress, Moore, & Lawrence 633 (Bm, Go). Telfair Co.: A. R. Moldenke 358 (Fg). Thomas Co.: W. H. Duncan 1313 (Gu--18499); A. R. Moldenke 305 (Fg); Oosting 94 (H--40426). Tift Co.: McAtee 3589 (Hi--52015); W. H. Rhoades s.n. [near Tifton, September 1935; H. N. Moldenke 17087] (Au--122769, Br, Bt, Dp, N, St); Van Halfern s.n. [Tifton, 4-20-26] (Ga), s.n. [Tifton, April 1926] (Ga). Toombs Co.: J. S. Harper 470 (N); A. M. Huger s.n. [Vidalia, April 1914] (Io--76638). Treutlen Co.: McKellar 44 (Gu--15514). Turner Co.: W. H. Rhoades s.n. [Ashburn, July 1929; H. N. Moldenke 17084] (Br, Bt, Ml, N, Nd, St). Twiggs Co.: A. R. Moldenke 391 (Fg). Ware Co.: A. R. Moldenke 335 (Fg); P. O. Schallert 251, in part (B, Go, Hi--54952, Je--6976, We), s.n. [8/1/40] (Bt--57984). Washington Co.: A. R. Moldenke 397 (Fg). Wayne Co.: P. O. Schallert 251, in part (Hi--146049, S). FLORIDA: Alachua Co.: Janish & Janish 264 (Du--392746, N); Murrill 111 (W--1846590); Small, DeWinkeler, & Mosier 11178 (N); Watson & Murrill s.n. [High Springs, 4/30/39] (Fl--30165); Weber & West s.n. [Paradise, 6-8-27] (Fl--21105). Baker Co.: L. H. Bailey s.n. [Glen Saint Mary, July 30, 31, 1918] (Ba); H. H. Hume s.n. [Glen St. Mary, Aug. 13, 1928] (Ba). Bay Co.: Davis & Davis 11452 (Hi--115553). Calhoun Co.: A. R. Moldenke 272 (Fg). Dade Co.: Small, Small, & DeWinkeler s.n. [Deering Hammock, Dec. 1921] (N, N). Escambia Co.: Ahles 7120 (Ur); Brinker 313 (I). Franklin Co.: H. C. Beardslee s.n. [Apr. 22, 1939] (Ob--97287). Gadsden Co.: Buswell s.n. [May 1928] (Bu); Exploration Party 1937 s.n. [14 Mar. 1937] (Fl--27328); Kinkaid & West s.n. [Mt. Pleasant, 4-18-30] (Fl--21107); McAtee 3349 (W--1368588); A. R. Moldenke 291 (Fg); O'Neill 551 (I), s.n. [River Junction, Apr. 19, 1925] (W--1241595); Small & Alexander s.n. [Chattahoochee, May

1931] (N, N); Small, Mosier, & Matthaus 12778 (H—82867, We); E. West s.n. [Chattahoochee, 8 Sept. 1931] (Fl—20997). Gulf Co.: Small, DeWinkeler, & Mosier 11225 (N, W—1738770). Hamilton Co.: West & Arnold s.n. [Jasper, 11 Apr. 1940] (Fl--32028). Holmes Co.: E. S. Ford 3551 (W—2230900). Jackson Co.: H. J. Banker 3685, in part (N); A. D. Brubaker 22 (St); Exploration Party 1937 s.n. [15 Mar. 1937] (Fl—27034); Grossman 7 (Fl--21108); H. N. Moldenke 8354 (N). Jefferson Co.: B. L. Wagenknecht 3615 (Lw, Lw). Lake Co.: L. H. Bailey 6812 (Ba). Leon Co.: J. P. Gillespie 365 (Hi—112936); R. K. Godfrey 53039 (N); Hume & West s.n. [Tallahassee, 29 March 1936] (Fl--20999); C. Jackson 184 (Ld); A. R. Moldenke 288 (Fg). Liberty Co.: A. R. Moldenke 277 (Fg). Marion Co.: H. N. Moldenke 1083 (Go, H--5468, N, Ob--68710, S, Up, Ur), 1084a (N, S, Up, Ur). Polk Co.: McFarlin 5775 (Mi). Wakulla Co.: Trott 100 (Ca—95388). Walton Co.: E. G. Hume 32-11 (Fl—2127). Washington Co.: Hodges s.n. [Chipley, April 23, 1937] (Fl-28083); F. H. Sargent s.n. [Careyville, June 20, 1950] (No--23913, Ok, We). County undetermined: McAtee 3590 [State Line] (Hi--52016). ALABAMA: Autauga Co.: R. M. Harper 25 (N, W--1365901). Butler Co.: W. H. Rhoades s.n. [Georgiana, July 1931] (Bt, Bt—29647, N). Escambia Co.: F. S. Blanton s.n. [Canoe, Oct. 25, 1932] (I); Gaines & Gaines 268 (N). Etowah Co.: W. H. Rhoades s.n. [near Ataltala, July 1918] (Ky), s.n. [near Attala] (Hs). MISSISSIPPI: George Co.: Demaree 32831 (Le); Diener 835 (Tl, Ur). Hancock Co.: Diener 865 (Ur). Harrison Co.: Demaree 28400 (N), 29006 (Au—122772, N, Ok, St), 30362 (Au—122771, N); Goodspeed s.n. [Biloxi, Apr. 1925] (Io--117498); R. J. Lemaire 802 (Tl); A. R. Moldenke 254 (Fg). Jones Co.: J. D. Ray 5017 (Hi—199516, N). Lincoln Co.: Webster & Wilbur 3282 (W--2068016). Pearl River Co.: Hummel s.n. [Pearl River, 17.IV.1958] (Go); A. R. Moldenke 250 (Fg); W. H. Rhoades s.n. [Poplarville, Sept. 1940; H. N. Moldenke 17086] (Br, Bt, N, St), s.n. [near Poplarville, Sept. 1940] (N). Scott Co.: W. H. Rhoades s.n. [near Morton, July 1927] (N). Wayne Co.: Cooley & Pease 3111 (Hi--193305). TENNESSEE: Henderson Co.: Sharp, Fairchild, Clebsch, & Clebsch 9298 (O). ARKANSAS: Calhoun Co.: Demaree 22509 (N). LOUISIANA: Beauregard Par.: A. R. Moldenke 708 (S). Bienville Par.: Moldenke & Woods 542 (S). Bossier Par.: Moldenke & Woods 546 (S). Claiborne Par.: Moldenke & Woods 544 (S). Evangeline Par.: Ewan 19365 (Tl). Jackson Par.: Moldenke & Woods 531 (S). Lincoln Par.: Moldenke & Woods 539 (S); B. Williams s.n. [Ruston, March 28, 1950] (Ca—86352, Tl). Natchitoches Par.: L. E. Fox 402 (Fx), 407 (Nc), 408 (Fx); A. R. Moldenke 699 (S); Ware s.n. [June 24, 1956] (S). Orleans Par.: Aydell s.n. [Feb. 1932] (Tl); Hummel s.n. [New Orleans, 17/4/1958] (S). Vernon Par.: A. R. Moldenke

Figure 18. Distribution of Verbena tenuisecta in the United States.

Herbarium curators who have material of this species from additional counties are asked to send it to the author for verification and record, so that future editions of this map may be more complete

Mapping by counties done by Andrew R. Moldenke



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704 (S). Webster Par.: Moldenke & Woods 545 (S). TEXAS: Angelina Co.: D. S. Correll 15325, in part (Rf); Lewis & Oliver 5242 (Nb); Lundell & Lundell 11065 (N, Rf). Chambers Co.: Miss Mathews 39 (Au). Galveston Co.: Mrs. A. F. Nelson s.n. [3-15-42] (Au). Hardin Co.: Cory 52723 (Du--362507, N, No--15429, W--1924344). Harris Co.: G. L. Fisher 200 (W--1074632), 52115 (Ew); L. H. Pammel s.n. [Houston, 3-16-29] (Io--132999); Traverse 981 (Au--179401), 1383 (Au--197025). Jasper Co.: Lundell & Lundell 10511 (Ca--767266, Du--364576, Ld, W--1887687), 10550 (Ld, W--1887693); Rose-Innes & Warnock 21818 (Au, N, S); Tharp s.n. [4/13/41] (Au, N).. Jefferson Co.: C. C. Albers 34008 (Au, Au), s.n. [8/29/34] (Au); J. F. Brenckle 48068 (N). Montgomery Co.: F. W. Gould 8580 (Au--191835). Nacogdoches Co.: Biggar s.n. [August 6, 1944] (Au). Newton Co.: Correll, Johnston, & Edwin 22258 (Ld); Tharp 253 (Mi), s.n. [7/23/39] (Au, Au). Orange Co.: Wild Wood Club s.n. [Orange, 3/22/31] (Au). Polk Co.: Cory 56706 (W--2007939); Girvin s.n. [Indian Res., March 15, 1940] (Au, Ca--882637, N); Tharp s.n. [5/14/42] (Au, Ca--882830); Tharp, Turner, & Johnston 54746a (Au--122755, Au--122762). Sabine Co.: Correll, Johnston, & Edwin 22229 (Ld); Parks & Cory 22734 (Tr), 22735 (Tr). San Augustine Co.: Lewis & Smith 4997 (Nb). San Jacinto Co.: Shinners 25811 (Hi--197681). San Patricio Co.: F. B. Jones 1341 (Fj). Shelby Co.: Rowell, York, & Tharp 47239 (Au). Trinity Co.: Cory 54830 (Rf). Tyler Co.: Parks & Cory 22131 (Tr); Tharp, Turner, & Johnston 54849 (Au--122754, St). Upshur Co.: Shinners 14012 (Gg--392103). Victoria Co.: Bindwall 28 (Au); Parks & Cory 11105 (Tr). Waller Co.: Cory 54251 (No--14789, Rf); Trew 202 (Au--122763). ARIZONA: Pima Co.: Ehlers & Ehlers 6361 (Mi); F. W. Gould 5303 (Gg--351007, N). CALIFORNIA: Los Angeles Co.: L. S. Rose 46296 (Gg); Mrs. V. M. Spalding s.n. [Los Angeles, 1924] (Ca--279772); M. Winter s.n. [Los Angeles] (V). Santa Barbara Co.: H. M. Pollard s.n. [Dec. 1, 1950] (Gg--385736), s.n. [June 7, 1957] (Gg--416660); C. F. Smith 2403 (Gg--355016). Ventura Co.: H. M. Pollard s.n. [Apr. 29, 1944] (Gg--330305), s.n. [Oct. 1, 1944] (Gg--330972), s.n. [Apr. 28, 1945] (Gg--330972). MEXICO: Yucatán: E. C. Stewart 683 (Mi). HISPANIOLA: Dominican Republic: Ekman H.12615 (N, S, W--1711546); Faris 478 (W--1145997). PUERTO RICO: Stevenson & Johnston 1845 (W--1475867). WINDWARD ISLANDS: Barbados: Bailey & Bailey 257 (Ba). VENEZUELA: Angostura: Bailey & Bailey 1856 [Ciudad Bolivar] (Ba). Federal District: Ll. Williams 10138 (Ve--12847). PERU: Cuzco: Herrera 3450 (N). BRAZIL: Paraná: Dusén 9341 (N, S, W--1481763); Hatschbach 4218 (Ok), 7444 (Ca); Hatschbach & Pereira 7689 [Herb. Hatschbach 10306] (Lw);

Hooker s.n. [Mai 1858] (Ug--10500); Swallen 8872 (W--1933141). Rio Grande do Sul: Archer 4233 (N, N, Sp--36826, Sp, W--1705702); Henz E.9591 (N); Ihering 373 (N, Sp--20071); Jürgens 47 (B); Osorio s.n. [Cerro Tobatinga, Feb. 24, 1947] (Ug--14136, Ug--14154); Rambo 3939 [Herb. Inst. Bot. S. Paulo 50988] (N), 43778 (Rb), 51652 (W--2102128), 51703 (S); A. R. Schultz 465 (N). State undetermined: J. F. T. Müller 262 (P), s.n. (P). BOLIVIA: Santa Cruz: Kuntze s.n. [400 m., Sta. Cruz, 5.1892] (N); Paredo s.n. [El Pari, 23-XI-1946] (Gg--353278, N). Sucre: M. Cárdenas 628 (N). PARAGUAY: C. Alvarez s.n. [Asuncion, 1954] (Je--8834); Balansa 1025 (N--isotype); Hassler 2650 (N), 6144 [Macbride photos 17451] (Ca--944365, Kr--photo, N, N, N--photo, S), 7607 (Ca--944366), 12411 (Ca--929695, N, W--1057342), 12518 (Ca--929705, N, W--1057406); Herter 84886 (N); Jörgensen 3771 [Herb. Osten 22243] (Du--197838, N, S, Ug, W--1483811), 3777 (N); Lindman A.3643 (N, S); Morong 219 (C, C, Mi, W--71964, W--1417046); Osten 8064 (Go), 9013 (S); Edw. Palmer s.n. [Capt. Page Exped. 1853] (W--227577, W--227580); Ponder s.n. [Asuncion] (Je--7615); Ponder & Alvarez s.n. [10.18.1952] (Je--7617); Reales 253 (N); A. Robert 849 (N); T. Rojas 2536 [Herb. Osten 18186] (Ug), 12995 (N); Sandeman 4824 (K). URUGUAY: C. Alvarez s.n. [Trinidad, 1954] (Je--8703); Arechavaleta 21 (Ug, Ug), 22 (Ug), 23 (Ug), 23 bis (Ug), 30 (Ug); H. H. Bartlett 19862 (Ca--772525, W--1904710); Berro 133 (N), 2991 (N), 6022 (N), 7225 (N); Cabrera 3244 [Herb. Osten 23345] (N, N, S, Ug); Cabrera & Corte 9590 (W--2197981); Castellanos s.n. [Belle Unión, Jan. 28, 1948; Herb. Inst. Miguel Lillo 15177] (N, N); Chebataroff s.n. [San Javier, 1939] (Ug--4762); Herb. Mus. Hist. Nat. Montev. s.n. [dept. Minas, Feb.] (Ug), s.n. [banks of Rio Negro near Mercedes] (Ug); Herter 181h [Herb. Herter 85536] (N), 1811 [Herb. Herter 96600] (N), 4411 (N), 50887 (N), s.n. [Nueva Palmira; Herb. Osten 19032] (Ug), s.n. [Paysandú, Sept.-Oct. 1907; Herb. Osten 20415] (Ug); Schröder s.n. [dept. Paysandú, Dec. 1924; Herb. Osten 17303] (Ug, Ug); Teisseire s.n. [Colonia, 1913] (Ug); D. Wright s.n. [Cunapiru, 1928] (Bm). ARGENTINA: Buenos Aires: Boffa 25 (N); Cabrera 1860 (N), 5179 (N), 5628 (Ca--882828); Commerson s.n. [Buenos-Ayres et Montevideo] (B); Eyerdam, Beetle, & Grondona 23443 (Ew); Hauthal 56 (N), 640 (N); Kuntze s.n. [Tandil, Nov. 1892] (N); Lefebre s.n. [Buenos Aires, 1885] (Br); Parodi 8962 (N), 12233 (N, N); Pastore & Troncoso 984 (W--1954401); Ruiz Leal 14887 (Rl), 14891 (Ss); Scala 11 (N); A. G. Schulz 5680 (Sz); Sota 24 (Gg--353277, N); Troncoso 984 (W--1858385); J. Tweedie s.n. [Banda oriental] (Bm, Bm); Wall & Sparre s.n. [Sierra Bachiche, 2/11/46] (Ew, Ew), s.n. [Sierra El Volcan, 3/11/46] (Ew, Ew); F. A. Wetmore 830 (W--

1065981). Catamarca: Wall & Sparre s.n. [La Negrillo, 28/11/46] (Ew). Chaco: R. M. Aguilar 409 (N), 843 (S, S); Jörgensen 2465 [Herb. Osten 11867] (Ug, Ug, W—1055175); Malvárez 1330 (Es, N); T. Meyer 139 [Herb. Osten 22660] (Ug); A. G. Schulz 1471 (N), 1471a (N), 1474 (N); Venturi 9780 (N). Córdoba: Castellanos s.n. [Valle de los Reartes, Dec. 15, 1919; Herb. Osten 15290] (Ug), s. n. [Herb. Mus. Argent. Cienc. Nat. 31195] (N); Cozzo s.n. [Barrio Jardin, I.1946] (N); J. Gutiérrez 89 (Gg—352680, N), s.n. [19/21 -II-1947] (N); Hieronymus s.n. [14.XI.1875] (N), s.n. [near Córdoba, 14.XI.1876] (Br, Ca—882829), s.n. [in vicinity of Córdoba, Nov. 18, 1876] (Ug); Kuntze s.n. [Córdoba, 15/XII/1891] (W—701723), s.n. [Córdoba, XII.1891] (N, N); Maldonado Bustos 95 (N), 103 (N, N); Moldenke & Moldenke 19712 (Es, Es, N); O'Donell & Rodriguez 266 (Ca, Ut—1154114b); Osten 13107 (Ug); Rodrigo 255 (N); Ruiz Leal 12098 (Ss); Scala 10002 (N); C. Skottsberg s.n. [Córdoba, 11/10/1948] (Go); Terribile 633 (N), 671 (N); Troncoso 291 (N, N). Corrientes: Alboff s.n. [9.XI.1896] (N); Berti & Escalente 338 (W—1987931); Cabrera 11735 (W—2198014); Ibarrola 1283 (Bm, S), 3218 (N); T. Meyer 6437 (Ut—72506), 6445 (Ut—1154036), 6610 (Ut—72508b, Ut—1154126); Pedersen 1323 (N, W—2122759), 3949 (N, S, W—2283324); Rodrigo 617 (N, N); Ruíz Huidobro 3742 (Es, N), 3769 (Es, N). Entre Ríos: Burkart 3616 [Herb. Osten 22179] (Ug); Cabrera 12360 (W—2370662); Lorentz 1483.6 (Vt), s.n. [Concepcion del Uruguay, 7.1877] (Go), s.n. [Concepcion del Uruguay] (B); T. Meyer 9993 (N); Ruíz Huidobro 3588 (N, We), 3637 (N); Schwacke s.n. [Concepcion del Uruguay, IV/1880] (Ja—46583). Formosa: Jörgensen 2470 [Herb. Osten 13675] (Ug); Morel 530 (Bm); Pierotti 10 [Herb. Inst. Miguel Lillo 72839] (Ca—165859, Ut—268566); Venturi 9099 (W—1591417); J. West 8470 (Ca—904844). La Pampa: Cabrera 6735 (N); J. Fortuna 14 (Ca), 17 (Ca—165937); Pasc s.n. [Chasicó, April 1940; Parodi 13647] (N). Misiones: Archer 4609 (W—1705471); Bertoni 1970 (Bm, N), 2562 (N); Ekman 1983 (N, S), 2033 (Mi, N, S), 2034 (S), 2035 (Mi, N); Grüner 378 [Herb. Osten 23178] (Ug); Lillieskold s.n. [Colonia Bonpland] (S); T. Meyer 11339 (N); Montes 1079 (N), 1825 [10] (N, N), 2278 (N); D. Rodriguez 578 [Santa Ana, Sept. 13, 1912; Herb. Inst. Miguel Lillo 31471] (Go, N); Ruíz Huidobro 5417 (N); G. J. Schwarz 1177 (N), 1251 (S), 1885 (N), 2217 (Au—122773, Ok), 2260 (N), 2502 (N), 3040, in part (S), 3086 (N, Rf), 3159 (N), 3232 (N). Santa Fé: Job 795 (N), 1050 (N); Kuntze s.n. [Ceres, Oct. 1892] (N); Ruíz Huidobro 3147 (N), 3359 (N); Ruíz Leal 14247 (Ss); Terribile 535 (N); Venturi s.n. [Herb. Mus. Argent. Cienc. Nat. 23683] (N), s.n. [Herb. Fac. Cienc. Buenos Aires 14] (Sp, Sp—25785). Arroyo Seco Island: Barriomuevo s.n. [7-II-1947] (N); Greco s.n. [7-II-1947]

(N). Province undetermined: Collector undesignated s.n. (N); Wall & Sparre s.n. (Ew). SWEDEN: Blom s.n. [5/8/1936] (Go). SPAIN: Secondaire 6917 (Lu). EGYPT: E. W. Baker 24 (Bm). CONGO LEOPOLDVILLE: Bredo 1159 (Br). SOUTHERN RHODESIA: A. Peter 30874 [V.31] (B); Saunders Davies s.n. [Umtali, 5.2.34] (Bm). SOUTH AFRICA: Natal: A. Peter 30392 [V.13] (B). Transvaal: J. G. Gilmore 1792 (Af); Goossens s.n. (Af); Kretzchmar s.n. (Af--7908); Meeuse 9137 (N, Z), 9143 (Cb); E. Wall s.n. [Nelspruit, 25/10/38] (Ew). ISRAEL: E. Wall 5, in part [2/532] (Ew). IRAQ: Lazar 432 (N, W--17411460). INDIA: Madras: Kuriakose s.n. [12-12-32] (N). Uttar Pradesh: U. Singh 163 (Ba--23763, Ca--36114, La, N). GREATER SUNDA ISLANDS: Java: Brinkman 744 (Bz--23757); Van Oosten 6 (Bz--23760). Sumatra: Dames s.n. (Bz--72930); Lörzing 8494 (Bz--23762). AUSTRALIA: New South Wales: Goode 145 (Bm). Queensland: R. Jones 102 (N); Pedley 534 (N). CULTIVATED: Argentina: Herb. Gen. Jard. Bot. B. A. s.n. (Ca--202825); Hieronymus s.n. [Córdoba, 14.XI.1875] (W--71963). Belgium: Collector undesignated 210 (Br); M. Martens s.n. [1838] (Br). California: Bailey & Bailey 7737 (Ba); Eastwood s.n. [Huntingdon's Place, Aug. 1915] (Gg--31412); Lemington s.n. [Pomona, Dec. 10, 1927] (Hp); McClintock s.n. [August 16, 1947] (N); Purdy s.n. [Ukiah, April 1925] (Gg--128571); Walther 141 (Ba), s.n. [Pasadena, June 1921] (Gg--31410); W. F. Wight 1636 (Cm); Woodcock 946 (Ba). Congo Leopoldville: RR.PP. Salésiens 341 (Br). Cuba: Marcus 1962 (N). Dominican Republic: Valeur 448 (N, W--1273798). England: Collector undesignated s.n. [in horto Anglia legi] (Lu). Florida: H. H. Hume s.n. [June 1920] (Ba). France: Herb. Decaisne s.n. [H. P.] (Br). Georgia: Eggleston 5104 (Dt). Germany: Mühlbach s.n. [Potsdam, 9 August 1942] (B). Hawaiian Islands: Neal s.n. [Apr. 11, 1929] (Bi), s.n. [June 1, 1941] (Bi), s.n. [Feb. 28, 1945] (Bi). Illinois: Herb. Div. Floric. Univ. Ill. 177 (Ur). India: Dewan 253 (Au--121732); Herb. Blatter 23484 (Xa); V. Mehra 7 (Dt). Italy: Herb. Harvey s.n. [h. M. P., junio 1843] (Du--166498); Lucci s.n. [Naples, summer 1924] (Cm). Java: C. A. Backer 22692 (Bz--23759); Bakhuizen van den Brink 2681 (Bz--23758), 2699 (Ut--26525a); Herb. Hort. Bot. Bogor. XV.K.A.XLV.10 (Bz, Bz--26437, N); Visser Smits s.n. [1916] (Bz--23761). Kenya: Herb. Hort. Reg. Kew. 2615 (Br). Louisiana: L. H. Bailey s.n. [New Orleans, July 28, 1918] (Ba). Maryland: McCann s.n. [9-15-36] (Md, Md). Massachusetts: L. H. Bailey s.n. [Cambridge, August 6--12, 1929] (Ba); R. E. Torrey s.n. [Amherst, Aug. 4, 1942] (Ms); Torrey & Wood s.n. [July 3, 1946] (Ms). Missouri: J. H. Kellogg s.n. [Shaw's Garden, Aug. 25, 1911] (N, N, W--1325358). New York: L. H. Bailey s.n. [Aug. 4, 1922] (Ba), s.n. [July 19, 1924] (Ba), s.n. [Aug. 10, 1924] (Ba), s.n. [July

23, 1925] (Ba), s.n. [Aug. 7, 1925] (Ba); Burdick 24 (Ba); Hartling s.n. [N. Y. Bot. Gard. Cult. Pl. 42722] (N); McSweeney s.n. [N. Y. Bot. Gard. Cult. Pl. R.305/39] (N); H. N. Moldenke 11282 (N), 18237 (N); Moldenke & Moldenke 11886 (N); R. C. Schneider s. n. [N. Y. Bot. Gard. Cult. Pl. 22428] (N); Seringhaus s.n. [N. Y. Bot. Gard. Cult. Pl. R.305/39] (N). Nicaragua: Garnier 615 (N); Maxon, Harvey, & Valentine 7243 (W—1180955). Oklahoma: Stratton 6125, in part (N, St—26159). Oregon: Dana s.n. [Hermiston, August 1937] (Or—36065). Pennsylvania: H. N. Moldenke 17095 (Au—122770, St). Philippine Islands: M. S. Clemens 18433 (Ca—368059). Puerto Rico: E. E. Barker s.n. [April 21, 1921] (Ba); Britton, Britton, & Boynton 8296 (N), 8712 (N); Moldenke & Moldenke 19536 (N). Russia: Herb. Hort. Bot. Petrop. s.n. (W—71991). Sweden: Herb. Regnell s.n. [Hort. Bergiano, 8/1897] (S). Switzerland: Herb. Meisner s.n. [20 Jul. 1837] (M). Texas: C. L. Lundell 10937 (N, Rf); Teas s.n. [Houston, June 1926] (Ba). Trinidad: Bailey & Bailey s.n. [Feb. 16, 1921] (Ba); W. E. Broadway 4997 (W—424788).

VERBENA TENUISECTA var. ALBA Moldenke, Annot. & Classif. List 109 & 113. 1939.

Synonymy: Verbena erinoides alba Benary ex Wittmack, Gartenfl. 49: 585. 1900. Verbena erinoides var. alba Moldenke, List Spec. Mold. Southeast. Set 12, nom. nud. 1930. Verbena erinoides alba Hort. ex Stapf, Ind. Lond. 6: 429. 1931. Verbena tenuisecta lus. albiflora Briq. ex Moldenke, Alph. List Invalid Names 51, in syn. 1942. Verbena erinoides var. alba Hort. ex Moldenke, Alph. List Invalid Names Suppl. 1: 24, in syn. 1947. Verbena tenuisecta alba Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209. 1951.

Bibliography: Wittmack, Gartenfl. 49: 585. 1900; Bull. Soc. Tosc. Ortic. 26: 36. 1901; Moldenke, List Spec. Mold. Southeast Set 10 & 12. 1930; Stapf, Ind. Lond. 6: 429. 1931; Grey & Hubbard, List Pl. Grow. Bot. Gard. Atkins Inst. 204. 1933; L. H. Bailey, Cat. Florists Handl. Verbenac. mss. 1935; Anon., Journ. Roy. Hort. Soc. Lond. 61: 401. 1935; Dermen, Cytologia 7: 161, 162, & 173. 1936; Moldenke, Annot. & Classif. List 109 & 113. 1939; Moldenke, Suppl. List Invalid Names 8. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 5, 75, & 102. 1942; Moldenke, Alph. List Invalid Names 47 & 51. 1942; Schnack, Anal. Inst. Fitotéc. Sta. Catalina 4: 18. 1942; Moldenke, Am. Midl. Nat. 32: 576. 1945; Moldenke, Alph. List Cit. 1: 18—20, 23, 56, & 291. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 24. 1947; Moldenke, Alph. List Cit. 2: 454 (1948), 3: 742 & 913 (1949), and 4: 979 & 1257. 1949; Moldenke, Phytologia 3: 72. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 9, 10, 107, 165, & 200. 1949; Moldenke, Phytologia 3: 289 & 290 (1950) and 3: 468. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2213. 1951; Mol-

denke, Journ. Calif. Hort. Soc. 15: 83. 1954; Moldenke, Résumé 12, 14, 118, 128, 224, 364, & 376. 1959; Moldenke, Phytologia 8: 123. 1961; Moldenke, Résumé Suppl. 3: 41 (1962), 4: 3 (1962), 5: 1 & 2 (1962), 6: 3 (1963), and 7: 2. 1963; Pearce, New High-lights in Fls. 20. 1963; Pearce, 1964 Garden Aristocrats 20. 1964; Moldenke, Résumé Suppl. 8: 5. 1964.

Illustrations: Wittmack, Gartenfl. 49: 585. 1900; Bull. Soc. Tosc. Ortic. 26: 36. 1901.

This variety differs from the typical form of the species in having white corollas, drying to a pale-lavender. It is described as a prostrate or trailing annual or perennial, sometimes suffrutescent, 15—60 cm. tall, spreading, the corolla-tube to 16 mm. wide, and the chromosome number: 2n = 10.

The type of this variety was collected by myself (no. 1163) in a dry sandy ditch at Sneads, Jackson County, Florida, on May 6, 1930, and is deposited in the Britton Herbarium at the New York Botanical Garden. The type of V. tenuisecta lus. albiflora was collected by Teodoro Meyer (no. 142) at Fontana, Chaco, Argentina, where it was not frequent, preferring grassy places rather than loose sand, in October, 1931, and is deposited in the Osten Herbarium at the Museo de Historia Natural in Montevideo.

The variety was apparently introduced into cultivation in 1900. Bailey (1935) says that seeds were at that time offered to the horticultural trade by Chester Jay Hunt (Little Falls, New Jersey), Muller-Seely, Trivetts, and Waterer. Earlier than 1935 seed were marketed by Bodger and by Haage & Schmidt. Seeds which produced L. H. Bailey s.n. [Oct. 3, 1926] came from Haage & Schmidt, Erfurt, Germany, as their no. 5200 and were sown by Dr. Bailey in May. Pearce (1963) says of the plant "Ferny mat-former. Pretty white flowers. Ever-bloomer", 6 inches tall, and sells the seeds at 25 cents per package. L. H. Bailey s.n. [May 17, 1923], cited below, bears a notation by the collector "with appendage or wing below anther" and E. P. Bradbury s.n. [Coolidge Nursery, 12/12/15] has a note by him [Dr. Bailey] "with a wing below anther". His no. 12227 has a notation to the effect that a duplicate was sent to Dr. Briquet in Geneva.

The variety has been collected in dry sandy ditches and grassy roads, on road shoulders, in campos and spiny campos, and along roadsides, flowering from October to July, in fruit in July and November. Schulz describes it as "very scarce". Common names recorded for it are "erinoides White" and "verbena blanca".

Material has been misidentified and distributed in herbaria as V. canadensis (L.) Britton, V. tenera Spreng., and typical V. tenuisecta Briq. D. S. Correll 15325 is a mixture with typical V. tenuisecta.

For those interested in dating the spread of species and varieties of this genus in new areas, following are the earliest dates so far known to me for the variety in parts of the southern United States: South Carolina: Florence County -- 1962. Georgia: Bleckley, Brook, Clinch, Decatur, Grady, Hancock, Jefferson, Lanier,

Lowndes, Screven, Telfair, Thomas, Ware, & Washington Counties -- 1962. Florida: Jackson County -- 1930; Calhoun, Gadsden, & Leon Counties -- 1962. Louisiana: Jackson & Vernon Parishes -- 1963. Texas: Angelina County -- 1956. Wagenknecht refers to it as "a common weed in sandy soil along roadsides."

In all, 51 herbarium specimens, including type material of most of the names involved, have been examined by me.

Citations: SOUTH CAROLINA: Florence Co.: A. R. Moldenke 448 (Fg). GEORGIA: Bleckley Co.: A. R. Moldenke 378 (Fg). Brook Co.: A. R. Moldenke 310 (Fg, Fg). Clinch Co.: A. R. Moldenke 331 (Fg). Decatur Co.: A. R. Moldenke 297 (Fg). Grady Co.: A. R. Moldenke 300 (Fg); Pyron & McVaugh 2195 (Gu--16187). Hancock Co.: A. R. Moldenke 393 (Fg). Jefferson Co.: A. R. Moldenke 401 (Fg). Lanier Co.: A. R. Moldenke 325 (Fg). Lowndes Co.: A. R. Moldenke 322 (Fg). Screven Co.: Ahles 54307a (Hi--200787); A. R. Moldenke 415 (Fg). Telfair Co.: A. R. Moldenke 395 (Fg). Thomas Co.: A. R. Moldenke 307 (Fg, S). Ware Co.: A. R. Moldenke 342 (Z). Washington Co.: A. R. Moldenke 398 (Fg). FLORIDA: Calhoun Co.: Davis & Davis 11624 (Hi--115552); A. R. Moldenke 274 (Fg); B. L. Wagenknecht 3620 (Lw, Lw). Gadsden Co.: A. R. Moldenke 292 (Fg). Jackson Co.: H. N. Moldenke 1163 (Go--isotype, H--5467--isotype, It--isotype, N--type, S--isotype, Up--isotype, Ur--isotype, W--1581747--isotype). Leon Co.: A. R. Moldenke 289 (Fg). LOUISIANA: Jackson Par.: Moldenke & Woods 536 (S). Vernon Par.: A. R. Moldenke 705 (S). TEXAS: Angelina Co.: D. S. Correll 15325, in part (Rf). PARAGUAY: T. Rojas 2528 [Herb. Osten 18185] (N, Ug). ARGENTINA: Chaco: T. Meyer 142 [Herb. Osten 22659] (Ug); A. G. Schulz 1473 (N), 2888 (N). Misiones: Bertoni 2265 (N); Ekman 2035 (S). CULTIVATED: California: Bailey & Bailey 7953 (Ba); E. P. Bradbury s.n. [Coolidge Nursery, 12/12/15] (Ba). Cuba: L. H. Bailey 12227 (Ba). Java: Herb. Hort. Bot. Bogor. XV.K.A.KLV.15 (Bz--23756). New York: L. H. Bailey s.n. [May 17, 1923] (Ba), s.n. [Oct. 3, 1926] (Ba). Oklahoma: Stratton 6125, in part (N, St--26160).

VERBENA TENUISECTA var. GLABRATA Moldenke, Phytologia 4: 451, nom. nud. (1953), 7: 259. 1960.

Synonymy: Verbena tenuisecta var. glabra Moldenke, Résumé 474, sphalm. 1959.

Bibliography: Moldenke, Phytologia 4: 451. 1953; Reitz, Sellowia 11: 57 & 134--135. 1959; Moldenke, Résumé 111 & 474. 1959; Moldenke, Phytologia 7: 259. 1960; Moldenke, Résumé Suppl. 2: 13. 1960; Reitz, Sellowia 13: 67 & 110. 1961.

This variety differs from the typical form of the species in having its leaf-blades subglabrate and the calyx only very sparsely strigillose.

The type of the variety was collected by Raulino Reitz (no. C. 1280e) on a campo at Sombrio, at an altitude of 10 meters, Santa

Catarina, Brazil, on September 12, 1945, and is deposited in the Britton Herbarium at the New York Botanical Garden. It is described by the collector at a creeping herb with rose-colored flowers. Common names recorded for it are the usual "camaradinha", "formosa sem dote", and "jurupeba" used for all the members of the genus in that area. It has been collected at altitudes of 10--15 meters, flowering in October and December. In all, 2 herbarium specimens, including the types of both names involved, have been examined by me.

Citations: BRAZIL: Santa Catarina: Reitz C.1279 (N), C.1280e (N--type).

VERBENA TENUISPICATA Stapf, Denkschr. Akad. Wiss. Wien 50: 34--35. 1885.

Bibliography: Stapf, Denkschr. Akad. Wiss. Wien 50: 34--35. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 53 & 102 (1942) and [ed. 2], 124 & 200. 1949; Moldenke, Résumé 158 & 474. 1959; Moldenke, Phytologia 10: 217, 218, & 301. 1964.

Tall perennial herb, simple, strict, 35--50 cm. tall; stems rigid, tetragonal, short-pilose especially on the edges, the hairs resting on very small tubercles, scabrously appressed, apparently double in two lines, the remainder smooth; leaves in outline ovate or ovate-oblong to ovate-lanceolate, the uppermost lanceolate, contracted into a short and narrow or often more or less broadened petiole, rather obtuse at the apex, deeply pinnately incised at the base, coarsely dentate above, the segments oblong or linear-lanceolate, dentate, strigose-hirsute on both surfaces with greatly appressed hairs especially on the veins beneath, inconspicuously revolute at the margins; bractlets ovate, about 2 mm. long, 2/3 as long as the calyx, acute at the apex, hirsute, densely ciliate on the margins; calyx 2.5--3 mm. long, 5-angulate, 5-toothed, white-membranous between the angles and the herbaceous teeth, ciliate on the margins, hirsute, sparingly glandulose; corolla blue, 3--3.25 mm. long, the tube short-exserted, scarcely incurved, the lobes of the limb obovate, subequal.

The type of this little-known species was collected by J. E. Polak and Th. Pichler in the dried-out portion of a swamp near Hamadan, Persia, on July 2, 1882. Stapf says of it "Der V. officinalis L. sehr nahe stehend, aber durch die feinen, kleinblüthigen Ähren und fast blauen Corollen verschieden." It has been misidentified and distributed in herbaria as V. officinalis L. and has been collected at 1300 meters altitude. Only a single specimen has been seen by me thus far.

Citations: IRAN: Gauba 1698 (B).

VERBENA TESSMANNII Moldenke, Phytologia 3: 45--46. 1948.

Bibliography: Moldenke, Phytologia 3: 45--46 (1948) and 3: 75. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94 & 200. 1949; Stellfeld, Trib. Farmac. 9 (10): 167. 1951; E. J. Sal-

isb., Ind. Kew. Suppl. 11: 263. 1953; Angely, Fl. Paran. 7: 6, 7, & 13 (1957) and 12: 17. 1958; Moldenke, Résumé 111 & 474. 1959; Angely, Fl. Paran. 16: 79 (1960) and 17: 47. 1961.

Herb; stems and branches elongate, sharply tetragonal, often slightly margined, rather densely spreading-pubescent or hirtellous, the hairs standing at right angles to the surface of the stem or branch; principal internodes 5--8 cm. long; nodes annulate; leaves decussate-opposite; petioles slender, 4--6 mm. long, rather densely hirtellous; leaf-blades firmly chartaceous, rather uniformly bright-green on both surfaces or somewhat lighter beneath, lanceolate, 2--4 cm. long, 7--15 mm. wide, acute at the apex, acuminate at thr base, irregularly and coarsely toothed, the lowest teeth often lobe-like, very rough above with long closely appressed white strigose hairs which are bulbous-based, irregularly and rather densely short-pubescent beneath with the pubescence densest and most conspicuous on the larger venation; midrib very slender, impressed above, prominent beneath; secondaries very slender, about 4 per side, impressed above, prominulous beneath; tertiaries rather few and subimpressed above, more numerous and subprominulous beneath; inflorescence terminal, spicate; peduncles slender, acutely tetragonal, spreading-hirtellous like the branches, 1.7--5 cm. long; spikes elongating to 4.5 cm. in fruit, densely many-flowered, the calyxes closely imbricate; bractlets lanceolate, about 6 mm. long, 1 mm. wide, attenuate-subulate at the apex, long-ciliate on the margins (the cilia white and antrorse), puberulent on the back; calyx tubular, about 13 mm. long, 5-costate, yellow-green with gray-carmine veins, rather irregularly short-pubescent or puberulent with whitish hairs, marked with scattered black capitate glands, the rim 4-toothed, the teeth about 2 mm. long, narrow-lanceolate, subulate-tipped, widely divergent and often recurved during anthesis and fruiting; corolla lilac, its slender tube to 19 mm. long, irregularly pulverulent on the outside, the limb about 8 mm. wide.

The type of this species was collected by Günter Tessmann -- in whose honor it is named -- as Herb. Mus. Paran. 2923, in clear campos at the edge of woods between shrubs and tall herbs at Fazenda Lagoa Dourada, near Vila Velha, at an altitude of 830 meters, 21 km. southeast of Ponta Grossa, Paraná, Brazil, on February 17, 1948, and is deposited in the Britton Herbarium at the New York Botanical Garden.

In all, 2 herbarium specimens, including the type, have been examined by me.

Citations: BRAZIL: Paraná: Stellfeld 4354 (N); Tessmann s.n. [Herb. Mus. Paran. 2923] (N--type).

VERBENA TEUCRIIFOLIA Mart. & Gal., Bull. Acad. Roy. Brux., ser. 1, 11 (2): 322. 1844.

Synonymy: Verbena exilis Schau. in A. DC., Prodr. 11: 553. 1847. Verbena teucrifolia Mart. & Gal. ex Moldenke, Résumé Suppl. 7: 10, in syn. 1963.

Bibliography: Mart. & Gal., Bull. Acad. Roy. Brux., ser. 1, 11

(2): 322. 1844; Schau. in A. DC., Prodr. 11: 553 & 555. 1847; Walp., Repert. 6: 687. 1847; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1178 & 1179. 1895; Perry, Ann. Mo. Bot. Gard. 20: 242, 249, 312, 331, 334, 335, & 356. 1933; Moldenke, Prelim. Alph. List Invalid Names 46. 1940; Moldenke, Alph. List Invalid Names 47. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 19, 20, & 102. 1942; Moldenke, Alph. List Cit. 1: 28, 143, 144, 207, 218, & 260 (1946) and 2: 479, 494, 496, 519, 540, 542, 549, 607, 626, 639, & 642. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 44. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 33, 36, & 200. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 14. 1949; Moldenke, Alph. List Cit. 3: 660, 683, 693, 715, 767, 802, 829, 831, 877, & 933 (1949) and 4: 1012, 1076, 1111, 1166, 1171, 1295, & 1303. 1949; Rioja & Herrera, Anal. Inst. Biol. Mex. 22: 584. 1951; Rzedowski, Anal. Esc. Nac. Cienc. Biol. 8: 105. 1954; Moldenke, Inform. Mold. Set 49 Spec. 3. 1954; Moldenke, Résumé 40, 43, 364, & 474. 1959; Lewis & Oliver, Am. Journ. Bot. 48: 639--641, fig. 12. 1961; Moldenke, Phytologia 8: 124 (1961) and 8: 212 & 423. 1962; Moldenke, Résumé Suppl. 3: 10 (1962), 4: 4 (1962), 6: 4 (1963), and 7: 10. 1963; Moldenke, Phytologia 8: 462 (1963), 9: 16, 17, 19, 24, & 84 (1963), 9: 396 & 398 (1964), 10: 94, 102, 105, 140, 141, & 218 (1964), and 11: 32. 1964.

Illustrations: Lewis & Oliver, Am. Journ. Bot. 48: 640, fig. 12. 1961.

A decumbent or procumbent to completely prostrate herb, forming dense mats closely appressed to the ground, 45--100 cm. in diameter, typically glabrous; stems several from a common base, prostrate or repent, more or less diffusely branched, to 45 cm. long, 4-angled, rooting at the nodes, covered with leaves and flowers in small heads from the leaf-axils, glabrate or hirtellous; leaves decussate-opposite; petioles margined; leaf-blades obovate in outline, 1.5--2.5 cm. long, cuneate at the base and narrowed or attenuate into the petiole, pinnatifid-laciniate or -incised, the segments oblong or linear-oblong, obtuse or obtusish at the apex, varying from bright-green or bright yellow-green and glossy to grayish, typically glabrous, often sparsely strigillose on both surfaces, subglaucescent beneath, the margins slightly revolute, the venation impressed above; inflorescence spicate or at first in small close and flat heads to 2.5 cm. wide, the spikes axillary or terminal, solitary, lax, sessile or short-pedunculate, scarcely surpassing the uppermost leaves, few-flowered; bractlets lanceolate, approximately half as long as the calyx, acuminate-acute at the apex, ciliate-margined; calyx 5--7 mm. long, typically subglabrous, often sparsely hirtellous or occasionally hirsute, its lobes short, acute; corolla hypocrateriform, rather large, varying from purple, light-purple, bright-purple, deep-purple, mauve-purple, bright mauve-purple, or reddish-purple to rose-lilac, magenta, red-mauve, lavender, violet, pinkish, or pink, rarely white, its tube slightly longer than the calyx, the limb 5--7 mm. long; anther-glands minute; cocci 2.5--3 mm. long, chiefly reticulate-scrobiculate, the commissural surface

muriculate or almost smooth; chromosome number: n = 15.

The type of this rather perplexing species was collected by Henri Guillaume Galeotti (no. 777, in part) in subalpine forests near the summit of Mount Orizaba, at an altitude of 10,000 feet, Vera Cruz, Mexico, in August, 1840, and is deposited in the herbarium of the Jardin Botanique de l'Etat at Brussels. The type of V. exilis was collected by Carl August Ehrenberg (no. 131) near Huaxalote, San Luis Potosí, Mexico, and was deposited in the herbarium of the Botanisches Museum at Berlin, now unfortunately destroyed. Liebmann 11328 bears a notation "excellent match for the type collection".

Galeotti 777, as represented by Macbride's type photograph no. 24699 of a specimen in the Delessert Herbarium at Geneva, has the leaves broad, very shallowly toothed, and is actually V. cameronensis L. I. Davis. The Brussels specimen of the same collection number is the real V. teucriifolia. Martens & Galeotti (1844) say of it "Affinis Verbenae erinoides Lam.; sed glabrite foliisque minoribus minus laciniatis nec tam profunde incisis differt." Schauer (1847) says "Affinis V. erinoidi, sed glabritie foliisque minoribus minus laciniatis mox tamen profunde incisis diversa."

The species has been collected in fields and wasteland, open or alpine meadows, lava beds and talus, moist pinewoods or pine woodlands, subhumid montane oak forests, dry waste ground near roadsides and among parched grass, fallow fields, arid grasslands, on open ground and among rock of pyramids, llanos and mountainsides, dry banks and steep slopes, grassy silty flats, and dry sunburned exposures, along roadsides, on lakeshores, and at the edges of cultivation. It inhabits dark-brown silt-loam, black volcanic dust and rock, bunchgrass meadows in black volcanic soil, semi-xeric sedimentary soil with some loam, red rocky soil, rich clayish loam on lakeshores, steep slopes of reddish gravelly clay-loam, volcanic soil on mountainsides, and dark sand in pine forests, at altitudes of 6,000 to 13,100 feet, flowering from March to December, fruiting in March and from June to September.

Beaman describes it as "abundant in moist black loam soil in large opening in Pinus hartwegii forest" and also "occasional on bare soil in grassy openings in Pinus-Abies-Cupressus forest", Powell & Edmondson as "abundant in red rocky soil of roadside", and Stone as "common in dry volcanic sand". Iltis, Koeppen, & Iltis say "plants creeping, weedy, on open disturbed edge of Festuca-Muhlenbergia-Piptochaetium-Sporobolus tussock grassland [sacatonal]" with scattered Strobus and many herbs like Castilleja, Eryngium, etc. Balls notes that "the plant appears to have a very long flowering period in pine woods and on open banks and slopes, usually in full sun; an excellent carpeter". Fearing & Thompson say "trailing among grasses in open prairie, black loam soil."

The flowers are described as "pink" on Hinton 11914; "lavender" on Leavenworth 292 and Schery 57; "purple" on Lundell & Lundell 12370 and Powell & Edmondson 746; "light-purple" on Fearing &

Thompson 98 and Oliver 179; "bright-purple" on Oliver 166; "deep-purple" on Balls 4866; "reddish-purple" on Balls 4481; "bright mauve-purple" on Balls 4067; "rose-lilac" on Iltis, Koeppen, & Iltis 85; "violet" on Galeotti 777; "red-mauve" on Balls 4182; "magenta" on Skutch 63; and as "mauve-purple to pinkish, with very rare albinos" on Balls 4565.

Material has been misidentified and distributed in herbaria under the names V. bipinnatifida Nutt., V. bipinnatifida Schau., V. ciliata Benth., V. elegans H.B.K., V. pumila Rydb., and V. teucriifolia var. corollulata Perry. On the other hand, the Stanford, Retherford, & Northcraft 241, distributed as V. teucrifolia, is actually V. wrightii A. Gray. Shreve 9147 is said to be a topotype and is a mixture with V. gracilis Desf.; Née 105 is a mixture with V. elegans H.B.K.; Schery 142 is a mixture with V. menthaefolia Benth., and Kenoyer s.n. [Popocatepetl, 7-2-38] is a mixture with Arenaria reptans Hemsl. in the Alsinaceae.

A vernacular name recorded for V. teucriifolia is "alfombrilla". Perry (1933) cites the following 18 additional specimens and 1 photograph not as yet seen by me: MEXICO: Federal District: C. R. Orcutt 3551 (E, F). México: Harshberger 41 (D, G); Pringle 2927 (F, G), 4180 (D, E, F, G). Michoacán: Arsène s.n. [Morelia, 9 July 1910] (F). Morelos: G. L. Fisher s.n. [Toro, Aug. 5, 1924] (E, F); Pringle 13792 (G). Puebla: J. G. Smith 464 (E); Stone s. n. [Chalchicomula, 8 April 1890] (D). San Luis Potosí: C. A. Ehrenberg 131 (E--photo). Vera Cruz: Galeotti 777, in part (K--isotype); C. L. Smith 1474 (G). GUATEMALA: Quezaltenango: Türckheim 1068 (D). The Pringle 4180 which she cites from "NY" is actually in the Columbia University herbarium; the Halsted s.n. [Mexico] & s.n. [sand hills, Perote] and E. W. Nelson 223 & 242 which she cites are regarded as V. ciliata Benth. by me. She says "The specimens cited vary greatly in degree of pubescence. The larger number are sparsely hirtellous or strigillose. The following are densely hirtellous-hirsute: Liebmann 11329, Nelson 196, 223, Smith 1474, Halsted, Smith 464, Nelson 242. The Guatemalan collections appear to be conspecific, although both the cilia of the bracts and the trichomes along the nerves of the calyx are somewhat coarser and stiffer than those of the Mexican material. V. teucriifolia is a slender plant easily separated from its nearest relatives by its prostrate or repent habit and few-flowered spikes."

The typical form of the species is glabrous or nearly so. It is very possible that the hairy form mentioned above by Miss Perry is not actually V. ciliata, but is what Schauer called V. exilis, which may very well be worthy of at least varietal status. Its original description reads as follows: "caule ramosissimo prostrato radicante, ramis teneris acute quadrangularibus pubescenti-hirtellis, foliis cuneatis basi longe attenuata quasi petiolatis

pinnatifido-incisis nervis supra impressis subtus strigillosis pagina infera subglaucescente, segmentis ovatis obtusiusculis margine revolutis integerrimis aut paucidentatis, spicis terminalibus alaribusque vix exsertis paucifloris compactis strigoso-hirtellis, bracteis oblongis acuminatis ciliatis calyce subulato-5-dentato subduplo brevioribus, appendice anth. dorsali minuta... Herbe teneritudine inter confines insignis. Folia 3—5 lin. longa, lamina 1 1/2—2 lin. lata, paribus ima basi subdilatata fere contigua. Spicae brevipedunculatae, vix e summis foliis emergentes, 3—5-florae. Calyx plicatus, 3 lin. longus, pube sparsa. Corollae tubus calycem paulo excedens, limbus parvus. Caps. calyce superius contorto duplo brevior, coccis reticulato-rugosis."

In all, 137 herbarium specimens, including type material of most of the names involved, and 4 photographs have been examined by me.

Citations: TEXAS: Hidalgo Co.: Clover 567 (N). MEXICO: Durango: Forrer s.n. [Sierra Madre] (Ba); Shreve 9147, in part (Fs). Federal District: Balls 4067 (W—1793579), B.4067 (Ca—684654); Barkley, Rowell, & Webster 2234 (Au—123247, N); Barkley, Webster, & Paxson 589 (Au—123257, N); L. I. Davis 204 (N); Degener & Degener 26246 (Gg, N, W); Fröderström & Hultén 600 (N, S); Hitchcock & Stanford 7037 (Ca—710709, Du—315617, N, Pl—130169, Po—266388, Ur); R. L. Oliver 179 (Bm); C. R. Orcutt 3551 (W—574736, W—1266865); G. A. Rovirosa 18 (Me); H. H. Rusby 124 (N); Yates & Wilcox 164 (Ak—31226). Guanajuato: M. C. Johnston 2636a (Au—122775); Liebmann 11329 (W—1315094); Née 105, in part (Q). Hidalgo: H. E. Moore 3122 (N); Rose & Hough 4484 (W—346457). México: Balls 4182 (W—1793591), B.4182 (Ca—684964); Beaman 2098 (Mi); Fearing & Thompson 98 (Au—183103); Harshberger 41 (Up, Up—17130, W—398132); Hinton 4398 (N); Kuntze 23738 (N, N); Lundell & Lundell 12370 (N, Rf, Rf, W—12370); Matuda 21078 (N), 21117 (N), 27656 (Z), 28700 (Cb); Moldenke & Moldenke 19849 (Es, Lg, N, Ot, Sm); H. E. Moore 22 (Ca—919327); R. L. Oliver 166 (Bm); Paxson & Barkley 16M840 (Au, N, N); Powell & Edmondson 746 (Au—193090); Pringle 2927 (Vt), 4180 (Br, C, Ca—25144, Es, Fs, Me, Me, Me, Mm—15388, Ob—50871, S, Vt, W—56189); Rowell 2037 (Cs); Schery 57 (Mi); A. J. Sharp 44120 (N); J. N. Weaver 699 (N, W—2134169). Michoacán: Arsène 59 (Gg—162490); Barkley, Paxson, & Webster 2654 (Au—123276, N); Hinton 11914 (N, W—1890945); W. C. Leavenworth 292 (N, Tu—35531, Ur); Schery 142, in part (Mi, Mi). Morelos: G. L. Fisher 337 (W—1207416), s.n. [Toro, Aug. 5, 1924] (Mv); T. Hunt 131 (Cb), 144 (Cb); Iltis, Koeppen, & Iltis 85 (Ws); Pringle 13792 (Fs, Gg—421274, Mi, S, St, Vt, W—462892, W—1586607). Nuevo León: Waterfall 16599 (Ca). Oaxaca: Liebmann 11308 (W—1315089), 11316 (W—1315841), 15563 (La). Puebla: Balls

4481 (W--1793651); Barkley, Rowell, & Webster 2395 (Au--123246), 2398 (N); L. I. Davis 238 (N); Kenoyer s.n. [Popocatepetl, 7-2-38] (Fs); Rose & Hay 6049 (W--395853). Querétaro: Waterfall & Wallis 14024 (Au--182857, St, W--2297208). Tlaxcala: Balls 4866 (W--1793724), B.4866 (Ca--684499). Vera Cruz: Balls 4563 (W--1793663), B.4481 (Ca--684694), B.4665 (Ca--685112); Beaman 2191 (Au--201055); Galeotti 777, in part (Br--type, F--photo of type, N--photo of type, Si--photo of type, Z--photo of type); Liebmann 11328 (W--1315093), 11330 (W--1315095); Matuda S.147 (Mi); E. W. Nelson 196 (W--257525); Wawra 929 (V). State undetermined: Berlandier 505 [Mexico] (Bm); Kuntze 23738 [Jalapa] (N, N). GUATEMALA: Chimaltenango: Skutch 63 (W--1585037). Quezaltenango: F. C. Lehmann 1603 (Bm, W--1323089, W--1323090); Türckheim 1068 (G, W--1323091).

VERBENA TEUCRIIFOLIA var. COROLLULATA Perry, Ann. Mo. Bot. Gard. 20: 335. 1933.

Bibliography: Perry, Ann. Mo. Bot. Gard. 20: 312, 335, & 356. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 19 & 102. 1942; Moldenke, Castanea 10: 40. 1945; Moldenke, Alph. List Cit. 1: 144 (1946) and 2: 540. 1948; Moldenke, Phytologia 2: 479. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 33 & 200. 1949; Moldenke, Alph. List Cit. 3: 799 & 829. 1949; Moldenke, Résumé 40 & 474. 1959; Moldenke, Phytologia 9: 16 & 17 (1963) and 10: 102 & 218. 1964.

This variety differs from the typical form of the species in usually being finely and densely pubescent, the calyx 5 mm. long, spreading-pubescent, the lobes very short, the corolla inconspicuous, its tube barely surpassing the calyx, the limb only 3 mm. wide, and the cocci 2.5 mm. long.

The type of the variety was collected by Charles Christopher Parry and Edward Palmer (no. 718) in the region of San Luis Potosí, Mexico, in 1878, and is deposited in the herbarium of the Missouri Botanical Garden at St. Louis. The variety has been found growing on plains at altitudes of 6000 to 8000 feet, flowering from June to August, fruiting in July and August. Material has been misidentified and distributed in herbaria as V. ciliata Benth. and as V. officinalis L. Parry & Palmer 719 is a mixture with V. ciliata.

Perry (1933) cites the following 9 additional specimens not as yet seen by me: MEXICO: Hidalgo: Orcutt 4146 (E, F); Rose, Painter, & Rose 8823 (G). San Luis Potosí: Parry & Palmer 718 (E--type, G--isotype), 719, in part (D, E, F). Zacatecas: Pringle 3551 (G). She comments that "The variety differs from the species chiefly in its smaller corollas; perhaps it is only a dimorphic form."

In all, 13 herbarium specimens, including type material, have been examined by me.

Citations: MEXICO: Federal District: L. I. Davis 232 (N). Hidalgo: Rose, Painter, & Rose 8823 (N, W--452306). México: Hinton

4398 (W--1822227); H. E. Moore Jr. 22 (Ms). San Luis Potosí: Parry & Palmer 718 (Io--isotype, Pa--isotype, W--56157--isotype), 719, in part (Io, W--56163). Zacatecas: Pringle 3551 (Me, Vt); Purpus 137 (W--470087).

VERBENA THYMOIDES Cham., Linnaea 7: 257. 1832 [not V. thymoides Chod., 1904, nor Phil., 1891].

Synonymy: Verbena thymioides Cham. ex Augusto, Fl. Rio Grande do Sul 233, sphalm. 1946. Verbena thymoides Cham. & Schlecht. ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963.

Bibliography: Cham., Linnaea 7: 257. 1832; Steud., Nom. Bot., ed. 2, 2: 751. 1841; Schau. in A. DC., Prodr. 11: 544. 1847; Schau. in Mart., Fl. Bras. 9: 193--194. 1851; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Chod., Bull. Herb. Boiss., sér. 2, 2: 818. 1902; Chod., Plant. Hassler. 197. 1902; Briq., Ann. Conserv. & Jard. Bot. Genèv. 7-8: 294. 1904; Herter, Florula 106. 1930; Herter, Revist. Sudam. Bot. 4: 186--187. 1937; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 39, 41, 44, & 102. 1942; Augusto, Fl. Rio Grande do Sul 213 & 233. 1946; Moldenke, Alph. List Cit. 1: 171 & 266 (1946), 2: 358, 444, 458, 532, & 533 (1948), 3: 688, 745, 772, 781, 782, 840, 876, 921, & 922 (1949), and 4: 1238, 1249--1251, & 1257. 1949; Cabrera, Lilloa 20: 175. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 94, 99, 100, & 200. 1949; Stellfeld, Trib. Farmac. 19 (10): 167. 1951; Moldenke, Phytologia 4: 188. 1953; Rambo, Sellowia 6: 60, 84, & 153 (1954) and 7: 260. 1956; Angely, Fl. Paran. 7: 13. 1957; Moldenke, Résumé 111, 118, 120, 128, 376, & 474. 1959; Angely, Fl. Paran. 16: 79 (1960) and 17: 47. 1961; Reitz, Sellowia 13: 67 & 110. 1961; Moldenke, Phytologia 8: 197 & 198. 1962; Moldenke, Résumé Suppl. 6: 11. 1963; Moldenke, Phytologia 9: 386 (1963), 9: 501 (1964), 10: 93 (1964), and 11: 274. 1965.

Slender shrublet, subcanescent-strigose throughout, sometimes resembling Thymus vulgaris or Satureja montana in habit, at other times resembling a Galium; stems slender, strict, ascending or erect, to 31 cm. tall, tetragonal, fastigiate above; leaves sessile, tripartite to the base, sometimes short, at other times much larger, the divisions linear, 8--25 mm. long, very narrow, sharply acute at the apex, revolute along the margins, the lateral ones bifid or entire; spikes sometimes subsessile, at other times more or less short-pedunculate, mostly few-flowered, capitate when young, soon becoming oblong and rather loose; bractlets ovate-lanceolate, 1/3 to 1/2 as long as the calyx, acuminate at the apex; flowers small; calyx subequally tubular, about 4 mm. long, colored, densely appressed-strigose, with scattered fuscous very shortly stipitate glands, the teeth subulate, slightly unequal; corolla varying from blue, blue-violet, pale blue-violet, or light blue-violet to violet or lilac, exiguous, the tube scarcely equaling the calyx, the limb puberulous, villous within, barbate at the mouth, its lobes narrowly cuneate, emarginate at the apex; stamens inserted in the throat of the corolla-tube; filaments very

short; upper anthers appendaged, the connective scarcely produced, with an inconspicuous subturgid gland on the back; fruit 2 mm. long; cocci fuliginous, striate on the back, slightly reticulate-areolate above, the commissural surface angulate and tannish-white.

This species is based on collections made by Friedrich Sellow (nos. 1482, 4769, and s.n.) in "Brasilia meridionalis" and were deposited in the herbarium of the Botanisches Museum at Berlin, but are now unfortunately destroyed. The V. thymoides of Chodat is V. balansae Briq., while that of Philippi is Junellia minutifolia (R. A. Phil.) Moldenke.

Verbena thymoides has been collected on rocky slopes and campos, sandy and dry grassy campos, in wet and grassy places, grassy fields and pinewoods, and at the top of mountains, at altitudes of 500 to 1200 meters, flowering from August to January, March, and June. Rambo collected it in a region of 2 meters rainfall, with rare snows, and a temperature of 0—25°. Rosengurtt found it frequent in pedregal. Schauer (1851) says of it "modo caulibus spithamaeis pedalibus strictis Thymo vulgari vel Saturejae montanae quodammodo similis, modo caulibus elongatis flaccidis magis Galium quoddam referens." The flowers are described as "blue" on Sellow s.n.; as "blue-violet" on Rosengurtt B.4926; as "light blue-violet" on Osten 6594; as "violet" on Berro 4755, Herter 1145, and Rambo 49549; and as "lilac" on Hatschbach 3373.

Material has been misidentified and distributed in herbaria as V. balansae Briq. and as V. tenera Spreng. On the other hand, the Osten 11638, 22375, 22375a, & 22375b, distributed as typical V. thymoides, all seem to represent f. albiflora Moldenke, while Dusén 10847 & 16907, Jörgensen 4582, and Pedersen 2906 are V. balansae Briq.

Schauer (1847, 1851) cites Riedel s.n. from "Brasilia meridionalis" and from "campis graminosis ad Araracoara, prov. S. Pauli, Febr.—Majo", deposited in the herbarium at Leningrad.

Briquet (1904), in his discussion of the closely related V. balansae Briq., compares the species as follows: "Cette gracieuse espèce se place immediatement a côte du V. thymoides Cham. dont elle possède les feuilles divisées jusqu'a la base en 3 segments linéares: elle s'en distingue par son calice longuement et étroitement tubuleux, et non pas brièvement campanule-tubuleux. La longueur du calice (dents comprises ne dépasse guère 4 mm. dans V. thymoides dont nous avons vu un original de Chamisso à l'herbier DC.) Le port nain et prostre du V. thymoides est aussi bien différent du port élancé fourni par le V. Balansae, mais nous donnons moins d'importance à ces caractères, vu la grande amplitude des variations attribuées par Chamisso a son V. thymoides au point de vue du port."

In all, 55 herbarium specimens, including type material of all

the names involved, and 9 mounted photographs have been examined by me.

Citations: BRAZIL: Paraná: Dusén 8591 (S), 15177 (S), s.n. [Capivari, 21.10.1908] (S), s.n. [between Lago & Desvio Ribas, 2.12.1910] (S), s.n. [Desvio Ribas, 17/2/1911] (S); Hatschbach 500 (N), 3373 (Z); Herb. Mus. Nac. Rio de Jan. 46599 (N); Rambo 35725 (N); Tessmann s.n. [Herb. Mus. Paran. 2695] (N). Rio Grande do Sul: Moldenke & Moldenke 19679 (Es, Lg, N, Ot); Rambo 34725 (N, S), 37827 (N), 43564 (Go); Reitz 3312 (N); Saint-Hilaire C².1841 (N); Schreiner s.n. (Ja—46574). Santa Catarina: Rambo 49549 (S); Reitz C.1062 (Rd); Smith & Reitz 10265 (W—2249369). State undetermined: J. F. T. Müller 76 (P); Sellow 1482 [Macbride photos 17454] (Kr—photo of cotype, N—photo of cotype, N—photo of cotype, N—photo of cotype, Z—photo of cotype), 4769 (Vt—cotype), s.n. [Brasilia] (Br—cotype, F—photo of cotype, N—cotype, N—photo of cotype, Si—photo of cotype, Ut—cotype, Z—photo of cotype). PARAGUAY: Hauthal 26 (N). URUGUAY: Arechavaleta 29, in part (N, Ug); Berro 4755 (N); Collector undetermined s.n. (Ug, Ug); Feague 1219 (Ug); Herter 1145 [Herb. Herter 83920] (Ca—360219, N), s.n. [Penitente, March 17—22, 1924; Herb. Osten 16998] (Ug); Herb. Herter 83788 (N); Legrand 1578 (Ug), 2573 (Ug), 2804 (Lg), 3376 (Ug), 3559 (Ug); Montoro Guarch 588 (N); Osorio s.n. [Valle Eden, Feb. 19, 1947] (Ug—13878); Osten 6594 (Ug); Rosa-Mato 571 (Ug—9816); Rosengurtt B.4926 (Ml, N, S). ARGENTINA: Misiones: Ekman 2021 (S), 2022 (S); Niederlein 539 (Ra—23607).

VERBENA THYMOIDES f. ALBIFLORA Moldenke, Phytologia 3: 178. 1949.

Bibliography: Moldenke, Phytologia 3: 178. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 100 & 200. 1949; Moldenke, Résumé 120, 421, & 474. 1959; Moldenke, Phytologia 8: 198. 1962.

This form differs from the typical form of the species in having white corollas. The flowers are described as being fragrant or even very fragrant.

The type of the form was collected by José Arechavaleta at Cerro de Nico Perez and Sierra de Tapambaí, in the department of Minas, Uruguay, in November or December, 1892, and is deposited in the Osten Herbarium at the Museo de Historia Natural in Montevideo.

The form has been collected in rocky places, on rocky hills and mountains, stony cliffs, and campos in granitic soil with full exposure to the sun, at an altitude of 300 meters, flowering from September to November. Material has been misidentified and distributed to herbaria as V. balansae Briq. and as typical V. thymoides Cham.

In all, 15 herbarium specimens, including the type, and 4 mounted photographs have been examined by me.

Citations: URUGUAY: Arechavaleta s.n. [Cerro de Nico Perez & Si-

erra de Tapambai, Nov.-Dec. 1892; Herb. Osten 3752] (Ag—photo of type, F—photo of type, N—isotype, N—photo of type, Ug—type, Z—photo of type), s.n. [Cerro de Nico Perez, Dec. 1892; Herb. Osten 3751] (Ug); Berro 1055 (N), s.n. [Franqueras, Oct. 1900; Arechavaleta 29, in part] (Ug, Ug); Herter 1145a [Herb. Herter 86120] (N); Montoro Guarch 2905 (N); Osten 11638 (Ug, Ug), 22375 (N, S, Ug), 22375a (Ug), 22375b (Ug).

VERBENA TOMOPHYLLA Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1061—1062. 1904.

Synonymy: Verbena incisa Chod. ex Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1061, in syn. 1904 [not V. incisa Hook., 1839, nor Hort., 1947].

Bibliography: Briq. in Chod. & Hassler, Bull. Herb. Boiss., sér. 2, 4: 1061—1062. 1904; Briq. in Chod. & Hassler, Plant. Hassler. 10: 484. 1904; Prain, Ind. Kew. Suppl. 3: 187. 1908; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 41, 44, & 102. 1942; Moldenke, Alph. List Cit. 1: 263 (1946), 2: 375 & 599 (1948), and 3: 662 & 693. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 99, 107, & 200. 1949; Moldenke, Phytologia 3: 290. 1950; Moldenke, Résumé 118, 128, 367, & 474. 1959; Moldenke, Phytologia 9: 361, 365, 367, & 397 (1964) and 10: 97 & 108. 1964.

Tall herb. to 1 m. tall; stems robust, erect, green, somewhat angled, branched, sparsely short-pilose; branches ascending; middle internodes 3—6 cm. long; leaves decussate-opposite, petiolate; petioles to 1 cm. long, shorter than the leaf-blade, antrorsely pilose-hirtous; leaf-blades ovate in outline, 4—5 cm. long, about 2.5 cm. wide, subacute or obtuse at the apex, pinnately lobed, cuneate at the base and prolonged into the petiole, green on both surfaces, glabrescent above, sparsely pilose beneath especially along the veins, the lobes few, coarsely incised-crenate, the sinus between the lowest lobes to 1.5 cm. deep; principal veins somewhat prominulous beneath, hardly visible above; spikes short, terminal, to 4 cm. long and 1.5 cm. wide exclusive of the corollas, more or less pedunculate, the flowers congested; bractlets lanceolate, 5—6 mm. long, somewhat shorter than the calyx, acuminate at the apex, pubescent on the back, rather long-ciliate along the margins; calyx tubular, about 8 mm. long, antrorsely densely pubescent, enlarged urceolate at maturity, the tube 6 mm. long, the mouth noticeably oblique, the teeth subulate, the anterior ones longer, 1.5 mm. long, the posterior ones shorter, less than 1 mm. long, all finally connivent; corolla medium in size, rose or vivid-rose to violet or purple, 3—4 mm. longer than the calyx, pubescent on the outside, the tube cylindric, exserted, equal, the limb patulous, about 5 mm. wide, its lobes obcordate, the larger ones 1.5 mm. long and 2—2.5 mm. wide; stamens and pistil included; style incrassate toward the apex, somewhat bilobed, surpassing the calyx-teeth by 3 mm. after anthesis; cocci sublinear-oblong, sordid yellowish-green, 2.5 mm. long and 0.8 mm. wide, elevated-reticulate on the outside.

The type of this species was collected by Emil Hassler (no.

3295) in thickets at Caraguatay, Paraguay, in October, and is deposited in the Delessert Herbarium at the Conservatoire et Jardin Botaniques in Geneva, where it was photographed by Macbride as his type photograph no. 24700. The species has been found in grassy places, on campos, in thickets, and "common" among trees, at 50 meters altitude, flowering from September to November and in March. The flowers on Hassler 3295 are described as "rose", on Jörgensen 2636 as "vivid-rose", on Grüner 115 as "purple", and on Jörgensen 3769, Lillo 8577, and Rojas 1382 as "violet".

Material has been misidentified and distributed in herbaria under the names V. calliantha Briq., V. erinoides Lam., V. hasslerana Briq., and V. incisa Hook. Jörgensen 3769 is actually a mixture with V. hasslerana Briq.

Briquet (1904) says: "M. Chodat a avec raison fait soivre sa détermination de la restriction 'affinis, an diversa?' En effet, si le V. tomophylla se rapproche quelque peu du V. incisa par ses feuilles incisées, il en diffère notablement par des caractères plus importants: les inflorescences nettement spiciformes [et non pas en capitules corymbiformes. 'broad depressed (not. spiked) corymbs' (Hook. Bot. Mag. tab. 3628)], les bractées étroitement lancéolées un peu plus courtes que le calice (ovées, quatre fois plus courtes que le calice dans V. incisa), les dents calicinales subulées (courtes et simplement acuminées dans le V. incisa), enfin par la corolle beaucoup plus petite, simplement pubescente extérieurement (deux à trois fois plus grande, à limbe étalé mesurant 1,5 cm. de diamètre, et glanduleuse extérieurement dans le V. incisa). En réalité, le V. tomophylla n'appartient pas à la même section (Verbenaca) que le V. incisa: il se place dans la section Glandularia, à côte du V. Aubletia L. de l'Amérique du Nord, dont il est très voisin et dont il se sépare par son calice dépourvu de glandes stipitées, et sa corolle pubescente extérieurement deux fois plus petite. Les appendices glanduliformes des deux anthères supérieures, sans être saillants extérieurement, sont cependent très nettement développés."

In all, 12 herbarium specimens and 4 mounted phototypes have been examined by me.

Citations: PARAGUAY: Hassler 3295 [Macbride photos 24700] (Kr—photo of type, N—photo of type, N—photo of type, Qu—photo of type); Jörgensen 3769, in part [Herb. Osten 22249] (N, S, Ug); T. Rojas 1382 [382; Herb. Osten 7900] (N, Ug). ARGENTINA: Formosa: Jörgensen 2636 [Herb. Osten 14552; Herb. Inst. Miguel Lillo 31373] (N, N, Ug, W—1065616). Misiones: Grüner 115 [Herb. Osten 23176] (Ug). Tucumán: Lillo 8577 [Herb. Inst. Miguel Lillo 31568] (N); Venturi 2651 (W—1591262).

xVERBENA TORPA Moldenke, Phytologia 5: 133. 1955.

Synonymy: Verbena urticifolia x neomexicana Dermen, Cytologia 7: 170. 1936. Verbena neomexicana (A. Gray) Small x V. urticifolia

L. ex Moldenke, Résumé 370, in syn. 1959. Verbena urticifolia L. x V. neomexicana (A. Gray) Small ex Moldenke, Résumé 377, in syn. 1959.

Bibliography: Dermen, Cytologia 7: 170. 1936; Moldenke, Phytologia 3: 468 (1951) and 5: 133. 1955; Moldenke, Biol. Abstr. 30: 1093. 1956; Moldenke, Am. Midl. Nat. 59: 362. 1958; Moldenke, Résumé 224, 370, 377, & 474. 1959; Moldenke, Phytologia 8: 121 (1961) and 10: 178. 1964.

This is the hybrid between V. urticifolia L. and V. neomexicana (A. Gray) Small, produced artificially by Dermen in Massachusetts in 1936. The two parental species do not grow together naturally anywhere, as far as I am aware, although both occur in Texas and a variety of V. neomexicana has been found as a waif in Baltimore, Maryland, where V. urticifolia is common. It is not very probable that this hybrid will ever be found in the wild unless the two parental species invade each other's territory in the future.

VERBENA TOWNSENDII Svenson, Am. Journ. Bot. 22: 253—254 & 271, pl. 3, fig. 1 a—d. 1935.

Bibliography: Svenson, Am. Journ. Bot. 22: 253—254 & 271, pl. 3, fig. 1 a—d. 1935; A. W. Hill, Ind. Kew. Suppl. 9: 295. 1938; Worsdell, Ind. Lond. Suppl. 2: 486. 1941; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 34 & 102. 1942; Moldenke, Castanea 13: 116. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 86. 1948; Moldenke, Alph. List Cit. 4: 982. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 71 & 200. 1949; Moldenke, Résumé 81 & 474. 1959.

Illustrations: Svenson, Am. Journ. Bot. 22: 271, pl. 3, fig. 1 a—d. 1935.

Glabrous erect herb, to 1 m. tall; stems tetragonal, about 3 mm. in diameter; principal internodes 5—7 cm. long; branches rigid, suberect, paniculate; leaves decussate-opposite, deeply trifid; petioles similar to the leaf-segments, 1—2 cm. long; leaf-blades with linear segments, 1—4.5 cm. long, about 1 mm. wide, revolute along the margins; spikes elongate, to 20 cm. long, borne at the apex of the branchlets, erect, filiform, the lower flowers becoming remote, often separated at maturity of the fruit by a space of 15 mm.; bractlets ovate, about 2.6 mm. long, acuminate at the apex, apparently about 2/3 as long as the calyx, ciliate along the margins, otherwise glabrous; pedicels about 0.5 mm. long; flowers very small; calyx about 2.7 mm. long; corolla small, lilac or lavender, twice as long as the calyx-tube, bearded in the throat, the limb 5-parted, the lobes 1.5 mm. long, the 3 lower ones slightly emarginate at the apex; stamens 4, didynamous; anthers broadly elliptic, 0.3 mm. long, equaling or longer than the filaments; filaments filiform, 0.1—0.3 mm. long; style bilobed; fruiting-calyx tetragonal, glabrous or rarely somewhat strigose, 4 of the teeth with incurved plicate tips slightly surpassing the fruit, the fifth (dorsal and innermost) tooth shorter and not curved; cocci 4, brown, 1.5 mm. long, prominently venose on the outer surface, white-roughened on the com-

missural surface.

The type of this species was collected by Henry Knute Svenson (no. 249) in gravelly soil below the escarpment, at an altitude of 50 feet, Academy Bay, on Indefatigable Island, Galapagos Islands, on April 10, 1930, and is deposited in the herbarium of the Brooklyn Botanic Garden. The collector notes that "It differs from V. littoralis in its glabrous character, narrow leaf segments, broader bracts, and more remote flowers." It is named in honor of Charles Haskins Townsend (1859--1944), American zoologist, director of the New York Aquarium, who collected plants in Alaska and on the Galapagos Islands. This endemic species is known only from the type collection and has been collected in anthesis in April. Svenson cites also Stewart 3317, 3318, and 3319 from Albemarle Island, but the first of these is regarded by me as V. glabrata H.B.K. and the last two as V. galapagosensis Moldenke.

In all, 2 herbarium specimens and 3 mounted photographs of the type collection have been examined by me.

Citations: GALAPAGOS ISLANDS: Indefatigable: Svenson 249 (F--photo of isotype, Gg--237859--isotype, N--isotype, N--photo of isotype, Si--photo of isotype, Z--photo of isotype).

VERBENA TRACHEA R. A. Phil., Anal. Univ. Chile 90: 609. 1896.

Synonymy: Verbena traquea R. A. Phil. ex Moldenke, Résumé 377, in syn. 1959.

Bibliography: R. A. Phil., Anal. Univ. Chile 90: 609. 1896; Durand & Jacks., Ind. Kew. Suppl. 1: 451. 1906; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42 & 102 (1942) and [ed. 2], 102 & 200. 1949; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 68. 1951; Moldenke, Résumé 122, 377, & 474. 1959; Muñoz Pizarro, Espec. Plant. Descr. Philipp. Ill. 1960; Moldenke, Phytologia 10: 137. 1964.

Suffruticose herb, low, much branched, hirtous, with short spreading hairs most dense on the branches; stems about 20 cm. long; leaves usually as long as the internodes, 2.3 cm. long and 1.8 cm. wide, tripartite, the segments almost always bifid or trifid, obtuse at the apex, revolute along the margins; peduncles elongate; spikes elongating after anthesis to 4 cm.; bractlets ovate-lanceolate, hispid, carinate, about half as long as the calyx; calyx 7 mm. long, hispid especially on the ribs, almost pectinate, the rim with very short triangular teeth; corolla twice as long as the calyx, glabrous on the outer surface; cocci to 3.5 mm. long.

The type of this little-known species was collected by Christian Ludwig Landbeck in the Cordillera de Colchagua, at an altitude of 2000 meters, Colchagua, Chile, in December, 1861, and is deposited in the herbarium of the Museo Nacional de Historia Natural at Santiago. Philippi says (1896) "La V. radicans difiere por ser mui lampiña etc., la microphylla Kth. por sus hojas mui pequeñas, del largo de solo 7 millímetros, sus espigas en cabezu-

ela, etc." He places V. trachea in the section Glandularia of the genus. Only a single photograph of the type collection has been seen by me thus far.

Citations: CHILE: Colchagua: Landbeck s.n. [Herb. Mus. Nac. Hist. Nat. Chile 42515 & 54732] (N--photo of type & isotype).

xVERBENA TRANSITORIA Moldenke, Phytologia 5: 133. 1955.

Synonymy: Glandularia laciniata x G. megapotamica Schnack & Covas, Revist. Argent. Agron. 12: 222 & 224. 1945. Glandularia laciniata x megapotamica Covas & Schnack ex Moldenke, Phytologia 5: 133, in syn. 1955. Verbena megapotamica Spreng. x V. tenuisecta Briq. ex Moldenke, Résumé 369, in syn. 1959. Verbena tenuisecta Briq. x V. megapotamica Spreng. ex Moldenke, Résumé 376, in syn. 1959.

Bibliography: Schnack & Covas, Revist. Argent. Agron. 12: 222 & 224. 1945; Schnack & Gonzalez, Revist. Argent. Agron. 12: 290. 1945; Moldenke, Phytologia 3: 467 (1951) and 5: 133. 1955; Moldenke, Biol. Abstr. 30: 1093. 1956; Moldenke, Am. Midl. Nat. 59: 362. 1958; Moldenke, Résumé 224, 296, 369, 376, & 474. 1959; Moldenke, Résumé Suppl. 2: 12. 1960; Moldenke, Phytologia 8: 12 (1961) and 10: 133. 1964.

This is the hybrid between V. tenuisecta Briq. and V. megapotamica Spreng. produced artificially by Covas & Schnack in Argentina in 1945. The two parental species grow together in Paraguay, Uruguay, two states of Brazil, and one province of Argentina, so it is possible that this hybrid may be found in the wild in these areas. It should have considerable horticultural merit and deserves further study and experimentation. Schnack & Covas apparently misidentified the one parent as V. laciniata (L.) Briq. instead of V. tenuisecta, and I mistakenly accepted their misidentification in my earlier references to this plant.

VERBENA TRIFIDA H.B.K., Nov. Gen. & Sp. Pl. 2: 273, pl. 134. 1817.

Synonymy: Verbena trifida Humb. ex Spreng. in L., Syst. Veg., ed. 16, 2: 749. 1825. Verbena trifida Humb. & Bonpl. ex Steud., Nom. Bot., ed. 2, 2: 751. 1841. Verbena trifida Humb. & Kunth ex D. Dietr., Syn. Pl. 3: 604. 1843. Verbena trifida Kunth ex Schau. in A. DC., Prodr. 11: 539. 1847. Verbena trifidi Kunth ex Moldenke, Alph. List Invalid Names 51, in syn. 1942.

Bibliography: H.B.K., Nov. Gen. & Sp. Pl. 2: 273, pl. 134. 1817; Steud., Nom. Bot., ed. 1, 874. 1821; Spreng. in L., Syst. Veg., ed. 16, 2: 749. 1825; Steud., Nom. Bot., ed. 2, 2: 751. 1841; D. Dietr., Syn. Pl. 3: 604. 1843; Benth., Pl. Hartweg. 245. 1846; Schau. in A. DC., Prodr. 11: 539. 1847; Paxt., Fl. Gard. 1: 169. 1850--1851; Lem., Jard. Fl. 1: Misc. 85. 1851; Stapf, Ind. Lond. 6: 431. 1931; Perry, Ann. Mo. Bot. Gard. 20: 342 & 356. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 31 & 102. 1942; Moldenke, Alph. List Invalid Names 51. 1942; Moldenke, Alph. List Cit. 1: 131 & 132 (1946), 2: 557 (1948), and 4: 1005 & 1074. 1949; H. N.

& A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 14. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 62 & 200. 1949; Moldenke, Phytologia 3: 451. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2213. 1951; Moldenke, Résumé 40, 69, 377, & 474. 1959; Moldenke, Résumé Suppl. 4: 20. 1962; Moldenke, Phytologia 9: 33 & 39 (1963) and 10: 140. 1964; Moldenke, Résumé Suppl. 8: 3 & 6. 1964.

Illustrations: H.B.K., Nov. Gen. & Sp. Pl. 2: pl. 134. 1817; Paxt., Fl. Gard. 1: 169. 1850—1851; Lem., Jard. Fl. 1: Misc. 85. 1851.

Shrubby, to 1 m. tall, canescent throughout; branches tetragonal, clustered in the leaf-axils, hirsutulous; leaves decussate-opposite, clustered, sessile, 1.5--2.5 cm. long, trifid or nearly so, cuneate at the base, strigose-hispidulous on both surfaces, the segments lanceolate, acuminate at the apex, revolute-margined, the central one larger, entire or sometimes laciniate, one or the other of the lateral ones obsoletely bifid or entire, the midrib impressed above, prominent beneath; spikes terminal, numerous, subsessile, short, conglomerate-capitate, very dense, hirsutulous; bractlets lanceolate, about equaling the calyx; calyx tubular, about 6 mm. long, nervose, conspicuously 5-parted, the laciniations conspicuous, subulate, subequal or slightly unequal; corolla purple or pale-violet, medium in size, its tube slightly longer than the calyx, the lobes of the limb rounded, emarginate at the apex.

The type of this perplexing species is said to have been collected by Friedrich Heinrich Alexander von Humboldt and Aimé Jacques Alexandre Bonpland between the village of Atotonilco and the natural bridge called Puente de Dantoe or Santa Virginia ["Totonilco-el-Grande, Dantae, S. Virginia"], Hidalgo, Mexico, at an altitude of 1800 feet. Dr. M. Martínez, in a letter to me dated December 14, 1950, localizes the so-called type locality as follows: "In the state of Hidalgo -- locate the city of Pachuca, then draw a line to the northeast and you will find Atotonilco el Grande or simply Atotonilco (not Totonilco as you spelled it). Then draw a line to the west to Actopan. On this line, and not far from Atotonilco is a small town named Sanctorum, and there is a river named Amajac. On this river is the Puente de Dantoe or Puente de Dios, a natural bridge 80 meters high. Santa Virginia is just a small village in the region."

It seems hardly probable that this distinctive plant should occur only in Hidalgo, Mexico, and then again in two states of Colombia, and not in the intervening areas. Inasmuch as it has not again been found in Mexico, it seems probable that the Mexican locality is the result of an error in labeling on the part of Humboldt and Bonpland. I suspect that the species is endemic to Colombia and that the type came from there, too. The species is said to have been introduced into cultivation in England in 1818 as a greenhouse plant and is described as "a curious plant". It has been found in Colombia at altitudes of 1800 to 3750 meters, flowering in March, July, and September. A vernacular name recorded for it is "sinamomo". Schauer (1847) cites Humboldt &

Bonpland s.n. and Hartweg 1353 from the Kunth and Berlin herbaria.

In all, 10 herbarium specimens and 1 mounted illustration have been examined by me.

Citations: COLOMBIA: Boyacá: Cuatrecasas 1247 (W--1772927), 1720 (W--1773116); Linden 1294 (F--876775). Cundinamarca: Apollinaire & Arthur 4 (W--603087); Hartweg 1353 (Lu, N); Holton s.n. [Bogota] (T); Huertas & Camargo 733 (F--1291995); Triana 2057 (Br, N). MOUNTED ILLUSTRATIONS: Fig. 103 (N).

VERBENA TRIFIDA var. DESERTICOLA Moldenke, Phytologia 3: 281. 1950.

Bibliography: Moldenke, Phytologia 3: 281 & 290. 1950; Moldenke, Résumé 122 & 474. 1959.

This variety differs from the typical form of the species in being a more branched and diffuse plant, with more slender and much weaker branches, and with the divisions of the leaves uniformly oblong or linear, 1--3 mm. wide, and more obtuse at the apex.

The type of the variety was collected by Ernesto Barros Valenzuela (no. 8010) at Quebrada La Chimba, Antofagasta, Chile, on September 20, 1940, and is deposited in the Britton Herbarium at the New York Botanical Garden. The variety is known to me thus far only from the type specimen.

Citations: CHILE: Antofagasta: Barros Valenzuela 8010 (N--type).

xVERBENA TRINITENSIS Moldenke, Résumé Suppl. 3: 14, 37, 39, & 41, hyponym (1962), nom. nov.

Synonymy: Verbena peruviana var. subbipinnatisecta Kuntze, Rev. Gen. Pl. 3 (2): 257. 1898. Verbena tenera x incisa x erinoides Hegi, Illustr. Fl. Mittel-Eur. 5 (3): 2240, in textu. 1927. Verbena briquetiana x tenuisecta Briq. ex Moldenke, Résumé 360, in syn. 1959. Verbena chamaedryfolia x subbipinnatisecta Kuntze ex Moldenke, Résumé 362, in syn. 1959. Verbena incisa Hook. x V. tenuisecta Briq. ex Moldenke, Résumé Suppl. 3: 39, in syn. 1962. Verbena tenuisecta Briq. x V. incisa Hook. ex Moldenke, Résumé Suppl. 3: 41, in syn. 1962.

Bibliography: Kuntze, Rev. Gen. Pl. 3 (2): 257. 1898; Hegi, Illustr. Fl. Mittel-Eur. 5 (3): 2240. 1927; Moldenke, Alph. List Cit. 2: 628. 1948; Moldenke, Résumé 360 & 362. 1959; Moldenke, Phytologia 8: 121 (1961) and 8: 419. 1962; Moldenke, Résumé Suppl. 3: 14, 37, 39, & 41 (1962), 4: 19 (1962), and 5: 6--8. 1962; Moldenke, Phytologia 9: 366 (1964) and 11: 271 & 279. 1965.

The type of this hybrid was collected by Carl Ernest Otto Kuntze at Trinidad, in southern Paraguay, and is deposited in the Britton Herbarium at the New York Botanical Garden. I regard the plant as a natural hybrid between V. incisa Hook. and V. tenuisecta Briq.

Osten, in a memorandum written at Montevideo in January, 1931, says "Wie von OK angeführte V. chamaedryf. var. subbipinnatisecta

OK, wegen der sich Briquet den Kopf zerbricht ist der spontan Bastard: Verbena [Nobiles, chamaedryf.] Briquetiana (rot) x [Glandularia, erinoides] temuisecta (violett) Briq. mit rosa Blüten, den auch ich loco classico bei Trinidad zwischen den Eltern traf (auch sonst in Paraguay nicht selten)."

Hegi (1927) says that this hybrid has given rise in gardens to "bunte Blumisten Verbenen" and "italienische Blumisten Verbenen" forms. These, however, are what we now usually regard as V. tenera var. maonetti Regel, and are quite different morphologically from Kuntze's and Osten's plants.

Only the type specimen has been examined thus far by me.

Citations: PARAGUAY: Kuntze s.n. [Trinidad, Std Paraguay] (N--type).

VERBENA TRISTACHYA Troncoso & Burkart, Darwiniana 7: 208—215, fig. 1, 2 c—p, & 3. 1946.

Synonymy: Glandularia tristachya (Tronc. & Burk.) Schnack & Covas, Bol. Soc. Argent. Bot. 1: 284. 1946.

Bibliography: Troncoso & Burkart, Darwiniana 7: 208—215, fig. 1, 2 c—p, & 3. 1946; Schnack & Covas, Bol. Soc. Argent. Bot. 1: 284 & 287. 1946; Moldenke, Phytologia 2: 339. 1947; Moldenke, Castanea 13: 119. 1948; Moldenke, Alph. List Cit. 4: 1192 & 1257. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 107 & 200. 1949; Schnack & Covas, Revist. Argent. Agron. 18: 107—108, fig. 1 G & H. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 101 & 263. 1953; Moldenke, Résumé 128, 296, & 474. 1959; Moldenke, Résumé Suppl. 2: 13. 1960; Moldenke, Phytologia 9: 381 (1964), 11: 186 (1964), and 11: 271. 1965.

Illustrations: Troncoso & Burkart, Darwiniana 2: 209, fig. 1, 211, fig. 2 c—p, & 213, fig. 3. 1946; Schnack & Covas, Revist. Argent. Agron. 18: 107—108, fig. 1 G & H. 1951.

Glabrous branched herb, probably biennial, erect, to 70 cm. tall, hygrophilous; root perpendicular, medium in size, with abundant fibrous superficial branches which extend from the crown and from the decumbent portion of the stem, with abundant adventitious hairs; stems short-decumbent at the base (the decumbent portion to 8 cm. long), the remainder erect, conspicuously fistulose, cylindric or obsoletely tetragonal, 2.5--5 mm. in diameter, glabrous, with the 4 angles somewhat prominulent throughout, smooth, not scabrous, more slender above and longitudinally 2-canaliculate; principal internodes rarely to 10 cm. long; leaves decussate-opposite, herbaceous, of the same color on both surfaces, lanceolate, 3.5--9 cm. long, 0.4--1.4 cm. wide, the upper ones linear and smaller, 2—4 cm. long and 2--4 mm. wide, all acute at the apex, attenuate to the sessile base, not auriculate, unequally and coarsely serrate-dentate along the margins with 4—7 unequal acute teeth, the upper ones obscurely dentate or entire, glabrous except for the more or less recurved margins which are sparsely short-pilose; midrib discernible above, prominent beneath; secondaries pinnate, small, discernible above, prominent

beneath; inflorescence dichasial; spikes terminal, biparous, mostly 3, rarely 1 (on less vigorous shoots) or up to 7 (on very vigorous branches), pedunculate, subcylindric, dense-flowered, 1.8—2 cm. long during anthesis and 7—8 mm. wide, elongate to 7 cm. after anthesis, forming secondary lateral groups at the ends of lateral branches on very vigorous shoots, separated by leaves from the terminal group; flowers 7—8 mm. long; bractlets lanceolate, persistent, 3.5—6 mm. long, ciliolate; calyx tubular, 5.5-6.5 mm. long, green, 5-costate, sparsely short-pilose on the veins, otherwise subglabrous, the rim 5-dentate, 4 of the teeth subequal, the 5th one very small; corolla violet, infundibular, its tube 6.5—7.5 mm. long, slightly surpassing the calyx, puberulent on the exserted portion outside, sparsely pilose throughout within, densely so at the throat, the limb exiguous, 2—2.5 mm. in diameter, the 5 lobes radiate, subequal, glabrous, obscurely emarginate at the apex; stamens 4, didynamous, inserted in the upper part of the corolla-tube; filaments short; thecae ovate, separate; style filiform, 6—7.5 times as long as the ovary, bilobed at the apex; stigma short, obtuse; ovary glabrous, 4-celled; mature fruit separating into 4 1-seeded schizocarps at maturity; cocci achene-like, subcylindric, dark-nigrescent, 3—3.5 mm. long, 0.6—0.7 mm. wide, striate below, reticulate on the back above; chromosome number: n = 5, 2n = 10.

The type of this species was collected by Arturo Erardo Burkart in "pajonal" opposite the port of San Nicolás on the Isla de las Lechiguanas, Delta Superior, Entre Ríos, Argentina, about 400 meters north of the mouth of the Río Paraná, on December 30, 1945, and is deposited in the herbarium of the Instituto Botanico Darwinion at San Isidro, Argentina. The type locality is described by Troncoso & Burkart (1946) as "pajonal típico de isla, de hierbas ásperas de 1,50—2 m. de altura, con estratos bajos muy escasos o nulos, con predominio notable de Aspilia sylphioides (Hook. & Arn.) Benth. & Hook., matas de Paspalum cfr. Haumani Parodi, muchas Compuestas, Labiadas, otras Gramíneas, Leguminosas, etc." They cite T. Meyer 2158 from Corrientes and comment "Verbena tristachya pertenece a la sección Verbenaca SCHAUER, caracterizada por carecer de glándulas anterales y a la serie Pachystachyae SCHAUER.....A esta serie emparentadas con la que acabamos de describer, a saber: V. stellarioides CHAM., con dos variedades, V. littoralis H.B.K., V. intermedia GILL. & HOOK., V. montevidensis SPRENG....., V. rigida SPRENG.....etc. De todas ellas es diferencia facilmente (sin entrar a considerar los caracteres florales distinton), por el tallo y por la inflorescencia. El tallos en ellas es marcadamente tetrágono, con los ángulos muy ásperos o escabrosos (excepto en V. stellarioides y V. montevidensis), mientras que en V. tristachya es cilíndrico u obscuramente tetrágono, completamente liso y glabro. En cuanto a la inflorescencia, V. littoralis, V. intermedia y V. montevidensis tienen inflorescencia multiespigada, mientras que V. stellarioides posee espigas terminales solitarias, rara vez hasta 2 ó 3 espigas por

vástago; en la nueva especie es típica una tríade de espigas. Puede formarse una serie de especies con progresivo aumento en el número de espigas por vástago: V. stellarioides (1--3 espigas), V. rigida (3), V. tristachya (1--7), V. intermedia, V. littoralis, V. montevidensis (infinitas). V. stellarioides, la más vecina de la nueva especie, se distingue además de ella por muchos detalles: inflorescencia capituliforme durante la antesis; internodio terminal (debajo de la espiga) visiblemente velloso; flores mucho mayores, con limbo amplio y extendido, tubo corolar exteriormente velloso-lanuginoso; brácteas muy subuladas, más largas que el cáliz, velloso-ciliadas; cáliz velloso en los ángulos. V. tristachya, por el contrario, posee inflorescencias espiciformes, internodio terminal glabro, flores menores con limbo reducido, corola apenas pubescente en la parte superior del tubo, brácteas menos subuladas, por lo general menores que el cáliz, pestañosas, y cáliz ligeramente pubescente. La difundida V. littoralis se diferencia por las espigas delgadas, de 3--4 mm. de diám. (en V. tristachya miden 6--8 mm. de diám.), flores de 4--5 mm., con el tubo corolar de 3,5--4 mm. de long., cáliz de 2,3--2,8 mm. de long., cubierto de pelitos breves uniformemente repartidos sobre su superficie, brácteas también menores, de 2--3 mm. de long. y pubescentes. En general, la planta se aparta al primer golpe de vista por lo muy ramificada, escabrosa en los tallos y multiespigada. V. intermedia, otre de las especies afines...se distingue, aparte de los rasgos ya comentados, por flores más grandes y vistosas, de color violáceo intenso, limbo corolar bien desarrollado, cáliz y brácteas con pelos glandulosos, estilo breve y estambres fijos en la mitad inferior del tubo corolar....Creemos interesante hacer notar que ningún autor cita el carácter fistuloso del tallo en el género Verbena. Tan es así que en un principio creímos que éste era un carácter especifico de la nueva especie, pero al efectuar cortes en los tallos de las especies afines, pudimos observar que V. stellarioides posee también tallo completamente fistuloso, aunque de cavidad menor. En V. littoralis las ramas superiores y los tallos jóvenes son macizos, observándose que los tallos más gruesos y los entrenudos inferiores son algo fistulosos, pero con una gruesa capa de meédula. V. intermedia y V. montevidensis tienen los tallos macizos. El tallo fistuloso y glabro de V. tristachya puede interpretarse como de adaptación ecológica a las islas de suelo húmedo e inundable..... El estudio anatómico del tallo de V. tristachya presenta como característica interesante, que le capa de parénquima clorofiliano es continua, es decir, que no se halla interrumpida en los ángulos por la columna esclerenquimática. Esta última estructura caracteriza a V. littoralis y V. intermedia. Esta observación la hacemos pues SCHNACK y COVAS.....establecen como uno de los caracteres diferenciales para separar los géneros Verbena y Glandularia, la interrupción o continuidad, respectivamente, del parénquima cortical clorofiliano en el tallo. Otro carácter que los

mismos autores consideran también diferencial y que en esta especie no lo es, es la relación longitud del estilo a altura del ovario. SCHNACK y COVAS.....consideran que en Verbena el estilo es tan largo o hasta tres veces más largo que el ovario, en Glandularia, por el contrario, es varias veces más largo. En V. tristachya es de 6 a 7,5 veces más largo que el ovario, y en V. stellarioides es 10 veces y media mayor. Por los demás caracteres, en cambio, V. tristachya es una auténtica Verbena. Seria interesante para resolver este problema, efectuar el estudio citológico de la nueva especies, el cual no pudimos realizar aún porque las semillas no germinaron."

The species has been collected only in "pajonal" and on river banks, flowering in December. In all, 6 herbarium specimens, including the type, and 2 mounted photographs have been examined by me.

Citations: ARGENTINA: Lechiguanas Island [Entre Ríos]: Burkart 15644 (F--photo of type, It--isotype, N--isotype, N--photo of type, Si--type). Misiones: Ekman 2024 (Mi, N, S).

VERBENA TRITERNATA R. A. Phil., Anal. Univ. Chile 90: 615, pl. 1. 1895.

Synonymy: Verbena biternata R. A. Phil. ex Moldenke, Résumé 358, in syn. 1959.

Bibliography: R. A. Phil., Anal. Univ. Chile 90: 615, pl. 1. 1895; Durand & Jacks., Ind. Kew. Suppl. 1: 451. 1906; Reiche, Fl. Chile 3: 277 & 279. 1910; Stapf, Ind. Lond. 6: 431. 1931; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 42 & 102 (1942) and [ed. 2], 102 & 200. 1949; Acevedo de Vargas, Bol. Mus. Nac. Hist. Nat. Chile 25: 69. 1951; Moldenke, Résumé 122, 358, & 474. 1959; Muñoz Pizarro, Espec. Plant. Descr. Philipp. 111. 1960.

Illustrations: R. A. Phil., Anal. Univ. Chile 90: pl. 1. 1895.

Low hispid herb; branchlets apparently about 4.5 cm. long, the apical portion divided into very short twigs which are densely foliose, the lower portion about 1.25 mm. in diameter, with distant dry leaves; leaves extending slightly beyond the floral corymbs; petioles very short, about 3 mm. long, ampliate; leaf-blades semicircular in outline, biternately or triternately dissected, the larger ones about 9 mm. long and 13 mm. wide, the segments linear, about 3 mm. long, rounded at the apex; flowers sessile, terminal, forming a compact corymb; calyx turbinate or very narrowly funnelform, to 6 mm. long, very bristly on the upper portion, the teeth very short; corolla red, 1 1/2 times as long as the calux-tube, the limb equaling the diameter of the tube.

The type of this curious species was collected by Rudolf Amandus Philippi at La Cueva, in the Cordillera de la Araucanía, Arauca, Chile, in January, 1887, and is deposited in the herbarium of the Museo Nacional de Historia Natural at Santiago, Chile. The original publication is sometimes cited as "1896", apparently in error. Reiche (1910) says: "en las cordilleras de la Araucanía; parece planta escasa. Observacion. La V. triternata i V. digitata

son mui poco diferentes; el carácter distintivo fundado en la base del estilo debe comprobarse en muestras mas numerosas; en vista de las localidades nativas, distanciadas en 13 grados, no me atrevo reunir las dos especies." Only a photograph of the type has been seen thus far by me.

Citations: CHILE: Arauca: R. A. Philippi s.n. [La Cueva, Jan. 1887; Herb. Mus. Nac. Hist. Nat. Chile 54783] (N—photo of type).

VERBENA TUMIDULA Perry, Ann. Mo. Bot. Gard. 20: 322—323. 1933.

Bibliography: Perry, Ann. Mo. Bot. Gard. 20, 244, 245, 248, 311, 322—323, & 356. 1933; Cory, Texas Agr. Exp. Sta. Bull. 550: 89. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 295. 1938; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 13, 14, 19, & 102. 1942; Moldenke in Lundell, Fl. Texas 3 (1): 18 & 38. 1942; Moldenke, Alph. List Cit. 1: 9, 32, 115, & 127. 1946; Moldenke, Wrightia 1: 231. 1948; Moldenke, Phytologia 2: 167. 1948; Moldenke, Alph. List Cit. 3: 708 & 798 (1949) and 4: 991 & 1212. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 24, 25, 33, & 200. 1949; Moldenke, Résumé 30, 31, 40, & 474. 1959; Moldenke, Phytologia 10: 92, 98, 102, & 104. 1964.

Herb; stems 15—20 cm. long, decumbent-ascending, branching, pilose-hirsute; leaves decussate-opposite; petioles margined; leaf-blades broadly ovate, 2—4 cm. long, cuneate at the base and narrowed into the petiole, trifid, with the segments again incised or coarsely crenate-dentate, appressed-pubescent or strigillose above, hirtellous beneath; spikes short-pedunculate, protruding slightly beyond the uppermost leaves, compact; bractlets ovate-lanceolate, not exceeding the calyx in length, acuminate at the apex, ciliate along the margins; mature calyx 8—9 mm. long, inflated at the base, hirsute, finely glandular, with subulate teeth about 1.5 mm. long; corolla purple-blue, the tube about 11 mm. long, puberulent on the outside, the limb 8—10 mm. wide; anthers not glandular-appendaged; cocci about 3 mm. long, the dorsal surface reticulate-scrobiculate, the lateral surfaces ventricose and smooth, the commissural face almost smooth.

The type of this species was collected by Ernest Jesse Palmer (no. 13512) at Barksdale, Edwards County, Texas, on May 7, 1918, and is deposited in the herbarium of the Missouri Botanical Garden at St. Louis. The type collection is inscribed "Real County" on the labels, but the locality is in Edwards County. The species is known from plains, blooming from May to November, on the Edwards Plateau and Trans-Pecos Area of western Texas from El Paso to Real and perhaps Bexar Counties. It has been collected in fruit in May, July, August, and November, at altitudes of 1225 to 2900 feet. Marsh says "flowering in spring". Cory 44509 consists of splendid specimens!

The C. Wright 455 cited below from El Paso County, Texas, is labeled "from W. Texas to El Paso, New Mexico", which means "from San Antonio to El Paso, Texas", and so the collection may actually have been made in one of several western counties of the state. The Collector undesignated s.n. cited below is from "Leon Spring" and

Dr. B. C. Tharp, in a letter to me, states that this is probably meant to be Leon Springs, in Bexar County -- it is annotated by Perry as V. delticola Small with a question.

C. Wright 1503 is a mixture with V. bipinnatifida var. latilobata Perry -- it was first identified as V. aubletia L., then as V. ambrosifolia Rydb. It may have been collected in western Texas instead of "N. Mexico" as stated on the label. E. F. Castetter, in a letter to me dated January 31, 1955, says that in twenty-seven years of botanical collecting in New Mexico he has never seen this species in that state.

Material of V. tumidula has been misidentified and distributed in herbaria under the names V. ambrosifolia Rydb., V. aubletia L., V. ciliata Benth., V. delticola Small, V. drummondii Baxt., V. lambertii Sims, and V. pumila Rydb.

Perry (1933) cites the following 3 additional specimens not as yet seen by me: TEXAS: Edwards Co.: E. J. Palmer 13512 (E--type). El Paso Co.: C. Wright 455 (G). NEW MEXICO: County undetermined: C. Wright 1503, in part (G). The C. Wright 1503 which she cites from "NY" is actually deposited in the Torrey Herbarium. She comments that "This species undoubtedly belongs to the section Glandularia, although apparently the anthers are glandless. Superficially, it resembles V. Gooddingii var. nepetifolia, but the spikes are not so large nor so showy. Its distinctive characters are the ventricose nutlets and the inflated fruiting calyx. The bracts, too, are broader and shorter than those of nearly related species of this group."

In all, 21 herbarium specimens, including material of the type collection, have been examined by me.

Citations: TEXAS: Bexar Co.: Collector undesignated s.n. [Plains near Leon Spring, Sept. 7, 1852] (N). Edwards Co.: Cory 38940 (N); E. J. Palmer 13512 (B--isotype, W--1603457--isotype); Parks & Cory 24483 (Tr), 26651 (Tr), 26826 (Tr). El Paso Co.: C. Wright 455 (W--56208). Real Co.: Cory s.n. [7-19-1936] (Md); G. L. Fisher 50103 (Ew, Gg--381246); Parks & Cory 19093 (Tr), 19094 (Tr); Tharp s.n. [Vance, 9/11/29] (Au). Uvalde Co.: Cory 44509 (Au). Val Verde Co.: Y. Anderson s.n. [Del Rio, Spr. 1921] (Wi). NEW MEXICO: County undetermined: C. Wright 1503, in part (T, W--71927). MEXICO: Coahuila: Marsh 150 (Au, Au). Tamaulipas: H. H. Bartlett 10030 (Mi).

VERBENA URTICIFOLIA L., Sp. Pl., ed. 1, 20. 1753.

Synonymy: Verbena peregrina, foliis urticae Dodart, Mém. Acad. Sci. Paris 4: 317. 1669. Verbena peregrina, foliis Vrticae Dodart, Mém. Acad. Sci. Paris 4: pl. 317. 1669. Verbena urticae folio Zanoni, Hist. Bot. 204, fig. 77. 1675. Verbena urticae folio, canadensis Tourn. apud P. Herm., Hort. Acad. Lugd.-Bat. Cat. 619, in syn. 1687. Verbena peregrina foliis urticae Dodart apud P.

Herm., Fl. Lugd.-Bat. 55, in syn. 1690. Verbena recta canadensis siue virginiana maxima urticae foliis J. Morison, Plant. Histor. Univ. Oxon. 3: sec. 11, pl. 25, fig. 3. 1699. Verbena americana urticae folio Dodart apud J. Morison, Plant. Histor. Univ. Oxon. 3: "408" [=418]. 1699. Verbena cretica urticae folio Zan. apud J. Morison, Plant. Histor. Univ. Oxon. 3: "408" [=418], in syn. 1699. Verbena urticaefolia canadensis Tourn., Inst. Rei Herb. 200. 1700. Verbena lamii folio Barrel., Plant. Gall. Hisp. 30, pl. 1146. 1714. Verbena urticaefolia, canadensis Tourn. apud Barrel., Plant. Gall. Hisp. 30, in syn. 1714. Verbena; canadensis; folio urticae Zanon. apud Boerh., Ind. Alt. Plant. Hort. Acad. Lugd., ed. 2, 1: 187. 1720. Verbena foliis ovatis, caule erecto, spicis filiformibus L., Hort. Cliff. 11. 1737. Verbena canadensis, folio urticae Boerh. apud L., Hort. Cliff. 11, in syn. 1737. Verbena recta canadensis seu virginiana maxima, urticae foliis Moris. apud L., Hort. Cliff. 11, in syn. 1737. Verbena foliis ovatis serratis, spicis filiformibus paniculatis A. van Royen, Fl. Leyd. Prod. 327. 1740. Verbena canadensis, folio urticae Zanon. apud A. van Royen, Fl. Leyd. Prod. 327, in syn. 1740. Verbena vrticaefolia canadensis Tourn. apud Michel, Cat. Plant. Hort. Caes. Florent. 98. 1748. Verbena foliis ovatis, caule erecto, spicis filiformibus paniculatis L., Sp. Pl., ed. 1, 20, in syn. 1753. Verbena recta canadensis, urticae foliis Moris. apud L., Sp. Pl., ed. 1, 20, in syn. 1753. Verbena tetrandra, spicis filiformibus paniculatis, foliis indivisis serratis petiolatis L., Sp. Pl., ed. 1, 20, in syn. 1753. Verbena tetrandra, spicis filiformibus paniculatis, foliis indivisis serratis petiolatis L. apud J. F. Gronov., Fl. Virg., ed. 2, 4. 1762. Verbena recta canadensis, s. virginiana maxima urticae foliis Moris. apud J. F. Gronov., Fl. Virg., ed. 2, 4, in syn. 1762. Verbena peregrina Dodart apud J. A. Murr. in L., Syst. Veg., ed. 13, 62, in syn. 1774. Verbena urticae folia, canadensis Tourn. apud Sabbat in Martelli, Hort. Roman. 3: 11, pl. 55. 1775. Verbena tetrandra, spicis filiformibus, paniculatis; foliis indivisis, ovatis, serratis, acutis, petiolatis L. apud Poir. in Lam., Encycl. Méth. Bot. 8: 548, in syn. 1808. Verbena foliis ovatis; caule erecto; spicis filiformibus, paniculatis L. apud Poir. in Lam., Encycl. Méth. Bot. 8: 548, in syn. 1808. Verbena (urticifolia), recta, foliis ovalibus seu ovali-lanceolatis, acutis; paniculis divaricatis; spicis filiformibus, distinctifloris Michx. apud Poir. in Lam., Encycl. Méth. Bot. 8: 548, in syn. 1808. Verbena recta, canadensis, urticaefoliis Moris. apud Poir. in Lam., Encycl. Méth. Bot. 8: 548, in syn. 1808. Veronica peregrina Dodart apud Poir. in Lam., Encycl. Méth. Bot. 8: 548,

in syn. 1808. Verbena diffusa Hort. ex Poir. in Lam., Encycl. Méth. Bot. 8: 550. 1808. Verbena urticaefolia L. ex Dum. Cours., Bot. Cult., ed. 2, 2: 623. 1811. Verbena diffusa Willd. ex J. Sm. in Rees, Cycl. 36: no. 18. 1817. Verbena diffusa Desf. ex Spreng. in L., Syst. Veg., ed. 16, 2: 748. 1825. Verbena tetrandra, spicis filif. paniculatis, fol. indivisis ovat. acut. serratis petiolatis L. apud H. E. Richter, Cod. Bot. Linn. 35. 1835. Verbena fol. ovatis, caule erecto, spic. filif. panic. L. apud H. E. Richter, Cod. Bot. Linn. 35. 1835. Verbena lamii fol. Barr. apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Verbena recta canadensis, urticae fol. Moris. apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Verbena peregrina, fol. urticae Dodart apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Verbena urticae fol. canadensis Ray apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Verbena peregrina, fol. urtic. Dodart apud Peterm., Cod. Bot. Linn. Ind. Alph. 196, in syn. 1840. Verbena recta canadensis etc. Moris. apud Peterm., Cod. Bot. Linn. Ind. Alph. 196, in syn. 1840. Verbena diffusa Lam. ex Eaton & Wright, N. Am. Bot., ed. 8, 470, in syn. 1840. Verbena recta canadensis urticae folio Moris. apud Walp., Repert. Syst. Bot. 4: 21, in syn. 1845. Verbena diffusa Poir. ex Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1178, in syn. 1895. Verbena urticifolia var. simplex Farwell, Papers Mich. Acad. Sci. 3: 103. 1924. Verbena urticifolia x simplex Gates, Fl. Kans. 191. 1940. Verbena hastata var. oblongifolia Andrews ex Moldenke, Suppl. List Invalid Names 8, in syn. 1941. Verbena urticafolia L. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena urtricifolia L. ex Moldenke, Alph. List Invalid Names 51, in syn. 1942. Verbena urticaefolium L. ex Moldenke, Alph. List Invalid Names 51, in syn. 1942; E. J. Palmer, Handb. Nat. Hist. 297 & 663. 1949. Verbena urticifolia x stricta Gates (in part) ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947 [not V. urticifolia x stricta Eggert, 1937, nor Norton, 1958]. Verbena urticifolia var. urticifolia [Moldenke] in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 129. 1952. Verbena urticaefolia var. hirsutior Engelm. ex Moldenke, Résumé Suppl. 3: 41, in syn. 1962. Verbena spicis longissimis, laxis, paniculatis, valdè diffusis; foliis ovato-lanceolatis, subpubescentibus, serratis; caule frutescente, subglabro Poir. ex Moldenke, Résumé Suppl. 4: 19, in syn. 1962. Verbena urticae folia canadensis Tourn. ex Moldenke, Résumé Suppl. 4: 20, in syn. 1962. Verbena urticifolia Gray & Small ex Moldenke, Résumé Suppl. 4: 20, in syn. 1962. Verbena imbricifolia McCann ex Moldenke, Résumé Suppl. 8: 5, in syn. 1964. Verbena urricaefolia L. ex Moldenke, Résumé Suppl. 8: 6, in syn.

1964. Verbena urticifolia var. typica Haw. ex Moldenke, Résumé Suppl. 8: 6, in syn. 1964.

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Erect annual or perennial herb, to 2.5 m. tall, coarse, often hispid; roots usually perennial; stems erect, solitary, simple below, often sparingly branched above from the upper nodes, stout, obtusely 4-angled, varying from more or less pubescent or rough-hairy with stiff spreading hairs to more or less hirtellous or al-

most glabrous, nearly all of the upper nodes producing perfect or rudimentary branches; branches axillary, decussate-opposite, upright or spreading, slender; leaves decussate-opposite, petiolate or the uppermost sessile, very frequently infested with leaf mildew; petioles slender, short, 2--4 cm. long, narrowly margined, rough-hirsute; leaf-blades very thin-membranous, dark-green on both surfaces, varying from ovate or broadly ovate to oblong, oblong-lanceolate, broadly lanceolate, oblong-ovate, or lance-ovate, 8--20 cm. long, acute or short-acuminate at the apex, mostly rounded at the base and decurrent into the petiole, coarsely serrate-dentate or serrate to somewhat doubly crenate-serrate with large rounded teeth which are minutely mucronulate at the termination of the veins, strongly venose, glabrous or more or less roughened or hirtellous with scattered long stiff hairs chiefly on the venation beneath, often minutely pustulate above, the hairs whitish, 1--1.3 mm. long; spikes numerous, paniculately disposed, usually clustered at or near the summit of the stems and branches and solitary in the upper axils, simple or branched, slender or filiform, green, interrupted, rather flaccid during anthesis, to 15 cm. long or longer, rather sparsely flowered, usually stiffly ascending and strigose when in fruit and remotely fruited; bractlets ovate-acuminate, very short, 1—1.5 mm. long, ciliate-margined; flowers small or minute, about 4 mm. long, separate or subopposite on the rachis, sessile; calyx tubular, 2--2.3 mm. long when mature, green, 5-ribbed, strigose or strigose-pubescent to minutely pubescent (especially along the veins), its lobes 5, triangular, about 2 mm. long, acute or obtuse, not connivent, the teeth short, subequal, subulate; corolla white, tubular or hypocrateriform, its tube curved, scarcely exserted from the calyx, pubescent, its limb 2--4 mm. wide, the throat closed by a ring of short coarse incurved hair, the lobes 5, small, short, blunt or rounded, the 2 upper ones smaller; stamens 4, in 2 pairs, inserted on or at the base of the corolla-tube; ovary superior, becoming 4-celled or rarely 2-celled; style single; stigma usually 2-lobed; mature schizocarp oblong, exposed at the distal end, 2--2.5 mm. long, obtuse at the apex, obtusely 4-angled; cocci mostly 4, narrowly oblong or ellipsoid, trigonous with a convex back, about 2 mm. long, pale-brown, more or less enclosed by the mature calyx, smooth or almost smooth, corrugated and faintly striate or ribbed on the back, the commissural faces meeting at right angles; chromosome number: n = 7, 2n = 14.

This common species grows wild from Quebec and Ontario to North Dakota, south to Florida and Louisiana, and west to Oklahoma and Texas. The name is based on numerous pre-linnean designations, but the actual type is probably the specimen collected by Carl von Linné in the George Clifford garden in or before 1737 and preserved as sheet 5 under genus 834 in the Clifford Herbarium at the British Museum (Natural History) in London. The three sheets in the Stockholm herbarium from Linnaeus' own herbarium are probably not of the type collection, since they seem to be from material cultivated in Uppsala and are probably the basis for his description in Hort. Ups. (1748) -- the Nietzel specimen is inscribed on

the obverse side, in pencil, "cfr. Verbena ll urticifolia L. sp. pl. 20", and on the reverse side, in pencil, "Linné herb." and, in ink, in Montin's handwriting, "Verbena (urticifolia) tetrandra, spicis filiformibus paniculatis, foliis indivisis ovatis serratis acutis petiolatis. Sp. pl. ed. 2. n. 13. Habitat in Virginiae, Canada aridis. Specimen ex horto Upsal. communicavit hortul. Nietzel." The first Linnaeus specimen is inscribed on the obverse side, in pencil, "Verb. ll. urticifolia L. sp. pl. 20" and, in ink, in Linnaeus' own handwriting, "ll urticifolia", and on the reverse side, in pencil, "Linné herb." and, in ink, in Linnaeus' own handwriting, "Verbena urticae folia", under which there appears, in pencil, "Linné pater scripsit!"; then, in ink, in Linnaeus' handwriting, "ex horto ups." and beneath that in a later hand "von Linné sen. scripsit" and then, in ink, "Herb. Alstroemerii" and in Dahl's hand "a Linné f."

The second Linnaeus specimen is inscribed on the obverse side, in ink, "VERBENA" and on the bottom of the sheet in Linnaeus' own hand "urticifolia", and on the reverse side, in pencil, "Linné herb." and, in ink, "Verbena tetrandria, spicis filiformibus paniculatis, foliis indivisis serratis. Lin. Spec. plant. 20. ll." and in Linnaeus' own hand "Hrt. Ups. 1.9.4."

Walpers (1845) places the species in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Micranthae, and Secondary Subgroup Holophyllae, with 22 other species, keeping V. diffusa Lam. as a distinct species.

Hooker (1836), under V. hastata, says "From this the V. paniculata is probably not distinct, and the V. urticaefolia seems too nearly allied." The first half of this statement, of course, is quite true, but the second half has no basis in fact at all.

The description of V. diffusa in Rees, Cycl. (1817) is as follows: "Spreading Vervain, Poiret in Lam. no. 14. Pursh n. 7. — Spikes very long, lax, panicled, widely spreading. Bracteas acute, about as long as the calyx. Stem erect, much branched. Leaves ovato-lanceolate, serrated, somewhat downy. — Native of North America; cultivated at Paris, according to Poiret, on whose authority Mr. Pursh gave this species a place in his Flora. He speaks of it as having a near resemblance to V. urticifolia, with very small, somewhat purple, flowers. We have seen no specimen."

Poiret (1808) describes V. diffusa as follows: "Spicis longissimis, laxis, paniculatis, valdè diffusis; foliis ovato-lanceolatis, subpubescentibus, serratis; caule frutescente, subglabro" and then he follows this with a variety: "β. Eadem, caule hirsuto; spicis erectis, vix diffusis.....La variété β, qui pourroit bien être une espèce, & qui j'ai observée dans l'herbier de M. Desfontaines, a ses tiges velues, ses feuilles bien moins douces au toucher; ses épis plus nombreux, presque fasciculés, point diffus. J'y ai d'ailleurs reconnu les autres caractères de la plante que je viens de décrire." What this variety may actually be, is not clear from the description -- perhaps it could be V.

carolina L. or V. scabra Vahl. The former of these, however, was known to Poiret [as "10. V. caroliniana L. — Lam. — Willd. — Michx. — Dill."], so perhaps it was the latter to which he is here referring. The phrase "somewhat purple" flowers leads me to suspect that V. diffusa itself does not belong in the synonymy of V. urticifolia, but belongs with xV. engelmannii Moldenke. The actual specimen in the Desfontaine Herbarium would have to be consulted in order to determine this matter definitely.

W. S. Dana (1895), in referring to V. urticifolia, says: "It almost excites one's incredulity to be told that this uninteresting-looking plant, which grows rankly along the highways, is an importation from the tropics, yet for this statement the botany is responsible." Just what "botany" is responsible for this curious and totally erroneous statement is not know to me.

The spelling of the specific part of the name of this plant has varied between "urticifolia" and "urticaefolia" in both pre-linnean and post-linnean work. However, Linnaeus proposed it as "urticifolia" in his Species Plantarum (1753), which is the starting-point for our nomenclature, and I see no justification for changing this spelling as so many other writers have done. Strausbaugh & Core (1958) actually spell it "ae" and "i" on page 774 of their work and "i" on page 775.

The type of V. hastata var. oblongifolia was collected by Timothy Langdon Andrews (no. 146) in Montgomery County, Tennessee, and is deposited in the herbarium of Iowa State College at Ames, while that of V. urticaefolia var. hirsutior was gathered by George Engelmann at Saint Louis, Missouri, in September, 1838, and is deposited in the Jesup Herbarium of Dartmouth College at Hanover, New Hampshire. The V. urticifolia var. riparia of Britton is regarded by me as a synonym of V. riparia Raf. This latter species, however, is reduced to synonymy under V. urticifolia by Taylor (1915), a disposition with which it is impossible for me to agree. Schauer (1847) reduces V. scabra Vahl to synonymy under V. urticifolia, but with a question. He cites the original L., Sp. Pl. reference to page "29" in error.

Barrelier (1714) cites "Quauh chian Hernan. 399" in the synonymy of our plant, but the "QVAVH CHIAN. Caulis coloris castanei nigricantis; fructus vt in Absinthio coloris castanei" of Hernandez, Rer. Medic. Nov. Hisp. 399 (1628) and Nov. Pl. 399 (1651) appears to be a mint, perhaps Salvia occidentalis Sw. Similarly, Verbena urticae folio canadensis, foliis incisis, flore majore Tourn. is given by me in my Résumé Suppl. 4: 20 (1962) as a synonym of V. urticifolia, but it actually belongs in the synonymy of V. officinalis L.

Several hybrids involving V. urticifolia are known: that with V. bracteata Lag. & Rodr. is xV. perriana Moldenke, with V. hastata L. is xV. engelmannii Moldenke, with V. hispida Ruiz & Pav. is xV.

fabricata Moldenke, with V. lasiostachys Link is xV. inhonesta Moldenke, with V. neomexicana (A. Gray) Small is xV. torpa Moldenke, and with V. stricta Vent. is xV. illicita Moldenke. The V. urticifolia x stricta of Eggert, of Norton, and of Gates (in part) are all xV. illicita. V. urticifolia var. paniculata Engelm. is xV. engelmannii.

Verbena urticifolia has been cultivated in European gardens for several centuries. Linnaeus found it in the Clifford garden in England in or before 1737. Hegi (1927) says of it "die bereits zur Zeit der Renaissance nach Schube in den schlesischen Gärten gepflegt wurde". He says that it is used medicinally "gegen Ausschlag". Hoehne (1939) reports its use as a lotion against poison ivy (Toxicodendron radicans) poisoning, while C. G. Lloyd says "regarded as a useful medicinal agent". J. A. Harris (1934) reports on the physico-chemical properties of the sap in relation to phytogeography based on specimens collected at Cold Spring Harbor, New York. Bailey (1935) lists only Lexington as offering the seeds to the horticultural trade. Mattoon (1958) does not list any dealer offering the seeds. J. M. Greenman 1374 was collected in Bartram's garden. The McCann s.n. [9-15-36] from material cultivated in Maryland, was grown from seeds secured from Copenhagen, Denmark, under the name V. imbricifolia.

Poindexter (1962), in his comparison of V. urticifolia with V. stricta, V. hastata, xV. engelmannii, and xV. illicita, describes V. urticifolia as having a leaf-index of 1.9—2.6 (average 2.2), leaf-shape broadly lanceolate to ovate, leaf-base rounded and decurrent into the petiole, leaf-apex gradually acuminate, stem pubescence hirtellous, nutlet length 1.6—1.9 (average 1.7), markings on the back of the nutlets moderately ribbed, pollen fertility 83—99 percent (average 94.2 percent), corolla-tube length 1.5—2.5 (average 2.1), calyx length 1.7—2.3 (average 2), and petiole lateral vein measurement 14—25 (average 19.6). Poindexter 9 had a chromosome count of n = 7. Both Schwencke (1931) and Patermann (1935) report the haploid chromosome number as 6. The tallest specimen of V. urticifolia that I have ever seen growing is cited below as A. R. Moldenke 65, from Botetourt County, Virginia — it was 8 feet 3 inches tall by actual measurement.

Demaree 20121 & 21480 represent a very hairy form of the species; F. C. Gates 20889 is also very hairy and was identified by the collector as "V. urticifolia x stricta", but I do not believe that it is a hybrid. H. N. Moldenke 1330 has the pubescence remarkably short. E. M. Kittredge s.n. [Aug. 23, 1921] is very abnormal, probably due to virus infection — it was examined in turn by Dr. Carl Epling and Dr. F. W. Pennell and was excluded by them from the Lamiaceae and Scrophulariaceae. Byars s.n. [Covington, Aug. 14, 1893] has the inflorescence fasciated due to virus infection and calls to mind Stachytarpheta jamaicensis f. monstrosa

(Moldenke) Moldenke. Van Dersal 303a is also anomalous and resembles xV. engelmannii. J. M. Fogg 11475 has its fruits very densely crowded on the spikes and may possibly be xV. engelmannii. Whitehouse 16426 is very close to V. carolina L. in appearance. E. E. Chambers 27 has inflorescences exactly like those of typical var. leiocarpa Perry & Fernald; C. J. Elmore s.n. [Talmage, July 6, 1891] may possibly be that variety. J. Torrey 747-O in the herbarium of the New York State Museum at Albany is inscribed "hybrid between V. urticifolia & V. hastata", but certainly is not a hybrid of any sort. Similarly, R. Bebb 2107 is inscribed "probably a hybrid form", but I do not think so. I regard both these specimens as representing typical V. urticifolia. Wills s.n. [July 27, 1959] was identified as xV. illicita by the collector, but seems to me to be typical V. urticifolia. S. Watson (1883) states that Palmer 2037 is "perhaps a hybrid between V. polystachya or V. urticaefolia and V. xutha", but I regard it as typical V. ehrenbergiana Schau.

Shinners 1479 is said to have had "fls. pale bluish-white" and Harris s.n. [June 26, 1933] is inscribed "fls. pink". It is possible that one or both of these represent var. incarnata (Raf.) Moldenke, which see. Hausman (1948) describes the flowers of V. urticifolia as white or pale-blue. I suspect that the pale-blue and pale bluish-white flowers were seen on specimens of xV. engelmannii, perhaps growing in close association with V. urticifolia, as it often does.

Shull (1914) germinated seeds of V. urticifolia after they were buried in mud covered with several inches of water for 4 1/4 years. Goss (1924) reports that he buried seeds of this species for twenty years -- 8 inches deep, gave 82.5 percent germination; 22 inches deep, gave 90 percent germination; 42 inches deep, gave 78 percent germination.

The species has been found growing in shade as well as in direct sunlight, in rich sand or in sandy soil, poor or alluvial sandy soil, open grassy sandy soil, heavy clay soil of hardwood forests, alluvial or shady alluvial soil, moist loam, loam soil or rich loam of wooded areas, loam soil of grasslands, open, dry, or rocky soil, moist or low moist soil, rich moist soil along streams, dry low open soil, damp or low moist rich soil, clay soil, open or sandy ground, moist or moist shady ground, waste ground and waste lands, low or low wet ground at the edges of swamps, and low land in general. Collectors report it from boggy or weedy meadows, low meadows and meadows in general, fields, old or open fields, fallow and ridge fields, pastures, swampy or abandoned pastures, damp or low wooded pastures, open or overgrazed pastures, rocky prairie pastures, dry clay and gravel fields, dry or sandy fields, potato fields, ditches, wet ditches, roadside and open roadside ditches, as well as in gardens, old cornfields, and old pecan orchards. It has been encountered in waste places about

dwellings, in woods, low rich or alluvial woods, open or rich damp woods, low or low moist woods, low woodlands bordering marshes, lowland woods along small streams, low brushy or bottom woods, upland and oak-hickory woods, moist shady and shaded creek woods, woodlands and wooded spring creek valleys, open or wooded ravines, shaded ravines and shaded ground under pecan trees, swamp and floodplain forests, pine forests, cleared low or grass areas, sandy low areas, in freshwater marshes, swampy places and open bogs along streams, in sandy or rich moist thickets, roadside thickets and thickets at the edge of prairies, swamps, swales, valleys, and barnyards. It grows on sandbars and sand flats, stream and creek banks, river and railroad banks, dry or steep banks, moist or alluvial banks, grassy banks, canal or damp lake banks, wooded river banks, and open railroad gravel banks, on floodplains and bottomlands, creek beds and creek bottoms, rocky creek bottoms, dry or sandy bottoms, low sandy or river bottoms, on limestone bluffs, on hillsides and shady steep hillsides, dry wooded hillslopes, high bottoms and pastured slopes, on low or loess ridges, mud and gravel flats, and prairies. It thrives along roadsides, dry or dry sandy roadsides, open or weedy roadsides, along highways, runs in fields, fencerows, old gravel roads, rivers, and peaty borders, at the edges of woods and upland forests, at the edges of saltmarshes and low cleared pastures, at the borders of woods and lakes, pine-oak and dry rocky woodland borders, at the sides of rivers, at lake margins, and sandy open cedar swamp margins. It has been collected at altitudes of 50 to 2100 feet, flowering in January and from May to October, fruiting from May to November.

Carpenter describes the species as "common, roadsides at lower altitudes" in Vermont. J. A. Harris (1934) says that it grows "in shady woods and bogs and along edge of lakes" in New York, while Egler (1943) reports it from "forest edges, in silt loam with limestone rock in full to partial light; occasional, single to several where present" in the same state. In Pennsylvania Benner (1932) found it in "rather dry soil of waste places, roadsides and fields; common", while Stone (1945) states "roadsides, gardens, waste places; common; fl. late June--early July". Merriman (1930) records it from "fields and borders" in Virginia. Randolph says "found in open fields and pastures usually in poor sandy soil" in West Virginia. Oosting (1942) avers that it occurs in various ecological communities -- birch dominance, mixed hardwoods, primary bottomland stands, and postclimax forest in the Piedmont of North Carolina. In Kentucky it is described as "a common coarse weed" by Shacklette, and to grow along "roadsides, waste places, and disturbed places in woods" by E. L. Braun (1943). G. N. Jones says (1945) that it grows along "roadsides and open woods, common" in Illinois, while Welch refers to it as "common" in Jasper County, Indiana.

Fults calls it "frequent" and Pohl (1955) found it in "low pastures and alluvial places, common" in Iowa, where Pammel refers to it as a common weed in sandy clay soil, associated with V. stricta, V. hastata, Anthemis cotula, Persicaria mitis, Ambrosia elatior,

and Coreopsis palmata, also as "a weed in open woods and pastures, associated with V. hastata, Xanthium commune, Echinochloa crus-galli, and Solanum nigrum" and as "a common weed in low ground and pastures, associated with Echinochloa crus-galli, Digitaria sanguinalis, Nepeta cataria, and V. hastata", and Pammel, Frankel, & Rieman speak of it as "common in alluvial sandy ground, associated with Poa pratensis, Polygonum acre, Persicaria pensylvanica, Ulmus americana, and Platanus occidentalis."

In Michigan it is said by E. G. Voss to be "frequent at edge of road through woods", "in dryish ground on roadsides, in thickets, and open woods, plentiful" by C. K. Dodge, and in "sandy leafmold just inside edge of open hardwoods, with Carex pensylvanica, Rumex crispus, Nepeta cataria, Quercus, and Ribes cynosbati" by Hamerstrom, while Darlington found it to be "occasional in open ground" in the Porcupine Mountains.

In Wisconsin it was encountered by Cull in "black loam on gravel, growing with Verbascum thapsus", by Shinners as growing with Verbena hastata and xV. engelmannii, by Fassett "in pasture with V. hastata and an apparent hybrid", by Arnot along "open dry roadside in former clay-soil prairie", by Iltis & Salamun "with Napaea dioica and Aster spp. in low weedy meadow", and by Wills on "mostly ungrazed wooded hillside of Potsdam sandstone moist from runoff water", while Iltis, Long, & Rudolph describe it as "weeds in cornfield on top of bluff" and Wunderlin says of it "weed, not common".

Gates (1940) states that it grows in thickets, waste places, and along roadsides in the eastern two-thirds of Kansas and refers to it as a therophyte or hemicryptophyte. The V. urticifolia x simplex which he records from Crawford County, deposited in the Ross Herbarium, seems to be typical V. urticifolia. In the same state Hetzer calls the species "rare in sandy soil", but Horr & McGregor call it "common in moist loam". McGregor also found it "scattered in moist prairie ravines", "scattered on banks of small creek", "scattered in woodland area along streams", and "common on rocky wooded hillside", Volle reports it "scattered in thickets in very dry sandy soil", Morley says "scattered on creek bottom", Horr found it "scattered in forest undergrowth, in loam with good moisture", Marsh encountered it "on wooded sandhills characterized by oak with walnut, hackberry, elm, mulberry, redbud, & sumac sparsely scattered", and Wagenknecht reports it from "upland pastures on southfacing hillside overgrown with honey-locust" and "at edge of oak-hickory woodland, calcareous soil". He also refers to it as a "weed along edge of disturbed area near farm pond in overgrazed prairie rangeland" and "weed at edge of field, sandy loam."

Demaree calls the plant "very common in valley land" in Arkansas; Palmer (1935) found it "in fields, roadsides, and waste ground; indifferent; general" in Missouri; and C. R. Ball calls it "common

in waste ground" in Louisiana.

In Oklahoma the species was encountered by M. Hopkins in "deep sandy-clay canyon with post-blackjack-dogwood forest on the floor mingled with Andropogon and Bouteloua", by Waterfall in "clay soil in low ground near water in Populus-Ulmus-Salix-Cephalanthus association," and by Cory as "frequent in fertile spots in small pasture near cowbarns". In Texas it grows in rich or open woods, bottomlands, and waste places and along streams, blooming from June to October, in the northeastern and eastern parts of the state, frow Bowie and Wilbarger to Newton, Brazoria, and Gonzales Counties. Thorne (1954) records it from "moist woods, thickets, and river banks.....infrequent", while Gibbes says "this foreigner has become a nuisance in our fields." Taylor & Hamblin (1963) refer to it as a weedy plant "often invasive for a small garden."

Common and vernacular names recorded for the species include "auslaendisches Eisenkraut mit Nesselblaettern", "bur-vine", "common vervain", "common white vervain", "la verveine de Canada à feuille d'ortie", "nettle-leaf vervain", "nettle leaved vervain", "nettle-leaved vervain", "nettle leaved Virginian vervain", "spreading vervain", "verbena", "verbena con foglia d'ortica di Canada", "verbena con foglie d'ortica", "verbena con foglie d'ortica di Canadà", "verveine à feuilles d'ortie", "verveine diffuse", "verveine etrangere a feuille d'ortie", "verveine etrangere, a feuille d'ortie", "white verbena", "white-verbena", and "white vervain".

Material of the species has been misidentified and distributed in herbaria under the names V. angustifolia Michx., V. carolina L., V. caroliniana L., xV. engelmanni Moldenke, V. hastata L., V. officinalis L., V. polystachia H.B.K., V. polystachya H.B.K., V. stricta Vent., V. urticifolia var. leiocarpa Perry & Fernald, Agastache nepetoides (L.) Kuntze, Eupatorium urticaefolium Reichard, Teucrium occidentale Gray, and Boraginaceae.

On the other hand, the Nichols 163 distributed as V. urticifolia is actually V. bonariensis L.; Botteri 180 and M. E. Jones s.n. [Huachuca Mts., Sept. 2, 1903] are V. carolina L.; A. M. Peterson 325 and Ugent, Weber, & Zimmerman s.n.[September 1, 1959] & s.n. [September 2, 1959] are V. hastata L.; Lawrence & Dress 570 is V. hastata f. albiflora Moldenke; M. E. Jones 29883 is V. neomexicana var. hirtella Perry; R. C. Alexander s.n. [22 Jan. '50], Blumer U.213, Clare 782, Combs 389, Curtiss 5111, Eggers 1152 & s.n. [Sierra de Luquillo, April 1883], G. L. Fisher 32217, Fredholm 3175, Hartweg 1558, Havard s.n. [Peña Colorado] & s.n. [Cottonwood Spg.], A. S. Hitchcock 269, Lindheimer 1077, A. C. Mathews s.n. [summer 1931], McAtee 1761a, C. T. Mohr s.n. [Pensacola, July 5, 1872], G. V. Nash 1248, Edw. Palmer s.n. [Biscayne Bay, 1874], E. J. Palmer 10692, S. B. Parish 5113, C. L. Pollard 1191, Rugel 639, Sintenis 767 & 1074, J. P. Standley 427, Tracy & Lloyd 22, Wiggins & Demaree 4734 & 4766, and C. Wright 3659 are

all V. scabra Vahl; J. A. Harris C.15997 and Wehmeyer 361 are V. urticifolia var. leiocarpa Perry & Fernald; M. Martens s.n. is Samolus floribundus H.B.K. in the Primulaceae; Arsène 5424 is Valeriana scorpioides P. DC. in the Valerianaceae; and Tosh 549 is Veronicastrum virginicum (L.) Farwell in the Scrophulariaceae.

Ripley s.n. [Sep. 10, 1902] was identified as V. officinalis and then as V. hastata and is inscribed "flowers blue, corolla sometimes white; leaves sometimes pinnatifid", but the specimen is typical V. urticifolia. W. C. Baker s.n. [Ithaca, 1905] in the Bailey Hortorium herbarium has a photograph of the plant mounted on the sheet with the specimen. J. A. Harris C.15997 is a mixture with var. leiocarpa Perry & Fernald. F. A. Smith s.n. [July 1896] is a mixture with xV. engelmannii Moldenke; Brinton s.n. [8.9.1878], Clevenger s.n. [Fletcher, Aug. 13, 1897], and A. Fitch s.n. [East Greenwich, 1865] with V. hastata L.; L. H. Pammel 960 with xV. illicita Moldenke; Schneck s.n. [Sept. 1, 1887] with V. stricta Vent.; Collector undesignated s.n. [Aug. 2, 1876] with Mentha longifolia (L.) Huds.; and A. S. Hitchcock s.n. [Smith Co., June 28, 1897] with Teucrium sp.

The Block Island, "Massachusetts", recorded for this species by me in my Résumé (1959) is an error for Block Island, Rhode Island. The Whiting 1757 cited below from Pope County, Illinois, may have been collected in Massac County instead. The Tharp s.n. [8.21.29] cited below from Brazoria County, Texas, may actually have been collected in Matagorda County — the label is inscribed "Brazoria—Bay City", but Dr. Tharp says, in a letter to me, "probably Brazoria County". The Sabat in Martelli, Hort. Roman. 3 (1775) reference in the bibliography is often given as page "10", but should actually be page 11. The reference in L., Syst. Veg., ed. 13 (1774) is often given as page "66" in error. There is no reference to V. urticifolia in Kniphof, Bot. Orig. Viv. cent. 2, pl. [284] (1757) as stated by some authors. Killiam 6933 has the collector's name misspelled "O. L. Killain" on its label. The "Sheffield" County, Ohio, recorded for this species by me in my Résumé 15 (1959) appears to be an error, since there is no such county in the state; it probably refers to Sheffield, Ohio, which is in Lorain County. Stapf (1931) cites a plate 4 in "Selby & Hicks, Bull. Ohio Agric. Sta. 175 (1906)", but the bulletin here referred to was authored only by A. D. Selby and there is no plate 4 included in the New York Botanical Garden library's copy nor any other illustration of V. urticifolia. Possibly the plates from Bulletin 142 were included in some copies of Bulletin 175.

Verbena urticifolia, according to Seymour (1929), is infested by the following fungi: Acrospermum compressum Tode, Aecidium verbenae Auct. amer. (non Speg.), A. verbenicola Ellis & Kellerm., Dicaeoma verbenicola Arth., Erysiphe cichoracearum DC., E. galeopsidis DC. (1815), E. galeopsidis Atk. (1897), E. lamprocarpa Auct.

amer, (in part), E. verbenae S., Oidium erysiphoides Fries, Puccinia sydowiana Diet., P. verbenicola Arth., P. vilfae Arth. & Holw., Septoria verbenae Rob., and Sphaerotheca humuli var. fuliginea (Schl.) Salmon. F. O. Holmes (1939) says that the species is susceptible to infection by one or another of the strains of tobacco-mosaic virus (Marmor tabaci Holmes). Selby (1906) says: "There are few other plants so commonly covered with the leaf mildew, Erysiphe cichoracearum DC., as is white vervain.....Seeds like the last [V. hastata], frequent in clover and grass seeds. The ever present mildew on the weed makes it a conspicuous and eye-offending pest that may be, and certainly if appearances count, will be destroyed by cultivation or grubbing." Mitchell (1960) and my son, Andrew Ralph Moldenke, report that the flowers of V. urticifolia are regularly visited by the bee, Calliopsis nebraskensis -- the female takes pollen and nectar, while the male takes only nectar.

C. N. Jones (1941, 1944) cites Goslin s.n. from Fairfield County, and Wolfe, Wareham, & Scofield s.n. from Hocking County, Ohio; F. E. Egler (1943) cites his no. 41-181 from Onondaga County, New York; K. L. Brooks (1961) records the species from Kings County, New York; E. L. Braun (1943) cites it from Bell, Bracken, Hart, Kenton, Letcher, Oldham, Owen, Pendleton, and Perry Counties, Kentucky; Gronovius (1739) cites Clayton 431 from Virginia, while Fernald (1938) records the species from York County, Virginia; Benner (1932) cites collections from ten localities in Bucks County, Pennsylvania; Ogden, Steinmetz, & Hyland (1948) record it from York County, Maine; E. J. Palmer (1930) records his no. 23662 & no. 25006 from Suffolk County, Massachusetts, and (1916) his no. 197 from Jasper County, Missouri. Deam, Kriebel, Yuncker, & Friesner (1945) record it from Adams, Huntington, Jay, and Randolph Counties, Indiana, and (1946) from Vermilion County; Deam, Yuncker, & Friesner (1951) from Switzerland and Washington Counties and (1953) from Bartholomew County; Loew (1949) also records it from Huntington County in that state. Pinkava (1963) cites the species from Sandusky County, Ohio.

Steyermark (1963) records this species from Adair, Andrew, Atchison, Audrain, Barton, Benton, Buchanan, Callaway, Carroll, Carter, Chariton, Christian, Clark, Cooper, Crawford, Dade, Dallas, DeKalb, Dent, Douglas, Dunklin, Gentry, Harrison, Gasconade, Holt, Howard, Howell, Johnson, Knox, Laclede, Lafayette, Lawrence, Lewis, Livingston, Macon, Madison, Mercer, Mississippi, Monitemu, Montgomery, New Madrid, Newton, Oregon, Osage, Ozark, Pettis, Polk, Pulaski, Putnam, Randolph, Ray, Reynolds, Ripley, Saint Charles, Saint Clair, Sainte Genevieve, Saline, Schuyler, Scotland, Shannon, Stoddard, Stone, Sullivan, Texas, Vernon, Washington, Wayne, Webster, and Wright Counties, Missouri, based on specimens in the herbarium of the Missouri Botanical Garden at St. Louis.

Schauer (1847) cites the following collections from the Berlin and DeCandolle herbaria: "In Americae septentr. civitt. austral.,

ad vias in civit. Ohio (Frank!), Missouri (Engelm.!), Carolina (Bosc!), Louisiana (Taint.!), tum circa Mexicum (H. et B.) et in Antillis majoribus Cuba (R. de la Sagra!) et Jamaica (Sw.!)." The Mexican specimen, of course, is V. carolina L. and the West Indian ones are V. scabra Vahl.

Perry (1933) cites the following 145 additional specimens not as yet seen by me: QUEBEC: Chambly Co.: Marie-Victorin 3124 (E). Montmorency Co.: Marie-Victorin 15750 (G). ONTARIO: Russell Co.: Scott s.n. [Casselman, 24 Aug. 1891] (G). MAINE: York Co.: Fernald & Parlin 928 (G). NEW HAMPSHIRE: Cheshire Co.: Robinson 559 (G); Williams s.n. [Walpole, 28 July 1901] (G). VERMONT: Addison Co.: Williams s.n. [East Middlebury, 14 July 1908] (G). Bennington Co.: M. A. Day 147 (G). Rutland Co.: Eggleston 1531 (G). Windham Co.: Robinson 134 (G). MASSACHUSETTS: Berkshire Co.: M. A. Day 79 (G). Bristol Co.: Sturtevant s.n. [Nonquit, 1888] (G). Essex Co.: Williams s.n. [Manchester, 18 Aug. 1895] (G). Hampden Co.: Morris s.n. [Monson, Aug. 1897] (E); F. C. Seymour 601 (E). Middlesex Co.: Lane s.n. [Waverley, 10 Aug. 1878] (G); Sturtevant s.n. [South Framingham, 25 July 1890] (E). Norfolk Co.: Williams s.n. [Dedham, 22 Aug. 1897] (G). Suffolk Co.: Deane s.n. [Belmont, 27 Sept. 1891] (G); Kennedy s.n. [Milton, 2 Aug. 1887] (G). RHODE ISLAND: Providence Co.: J. F. Collins s.n. [Providence, 20 July 1892] (G); Thurber s.n. [Providence, July 1844] (G). Block Island: Fernald, Hunnewell, & Long 10262 (G). CONNECTICUT: Hartford Co.: Wright s.n. [Hartford meadow, 3 Aug. 1882] (G), s.n. [Wethersfield] (G). New Haven Co.: Eaton s.n. [New Haven, 1858] (E). NEW YORK: Delaware Co.: Von Schrenk s.n. [Fleischmanns, 30 July 1892] (E). Saint Lawrence Co.: Mrs. O. P. Phelps 800 (G). Tompkins Co.: Eames & McDaniels 4870 (G); Trelease s.n. [Six Mile Creek, Ithaca, 8 July 1878] (E). Warren Co.: Seler 4560 (G). Washington Co.: Burnham s.n. [Vaughns, north of Hudson Falls, 8 Aug. 1912] (G). Westchester Co.: Stabler s.n. [Port Chester, 3 Sept. 1886] (G). NEW JERSEY: Middlesex Co.: B. D. Halsted 175 (G). Morris Co.: K. K. Mackenzie 4746 (E, G). PENNSYLVANIA: Dauphin Co.: J. K. Small s.n. [Harrisburg, 20 July 1888] (G). Lancaster Co.: A. A. Heller s.n. [Lancaster, August 29, 1900] (G). Philadelphia Co.: Greenman 1376 (E, G); MacElwee 882 (E); Redfield s.n. [near Philadelphia, 29 July 1871] (E). DELAWARE: New Castle Co.: Tidestrom 11572 (G). MARYLAND: Cecil Co.: Tidestrom 11413 (G). Prince Georges Co.: Symons s.n. [College Park] (E). DISTRICT OF COLUMBIA: F. Blanchard s.n. [near Long Bridge, 11 July 1891] (E); Bootcher 176 (E, G), 226 (E, G); Holm s.n. [Brookland, 19 July 1912] (E). VIRGINIA: Smythe Co.: J. K. Small s.n. [Marion, July 20, 1892] (E). WEST VIRGINIA: Cabell Co.: Randolph 474 (G). Randolph Co.: Greenman 244 (G). Tucker Co.: Greenman 245 (G). SOUTH CAROLINA: Anderson

Co.: J. Davis 8458 (E), 9117 (E). Orangeburg Co.: Ravenel s.n. [Santee Canal] (G). FLORIDA: Franklin Co.: A. W. Chapman s.n. [Apalachicola] (E). Leon Co.: Rugel s.n. [near Tallahassee, May 1843] (E). ALABAMA: Baldwin Co.: S. M. Tracy 8037 (E, G). MISSISSIPPI: Wilkinson Co.: Joor s.n. [Woodville, 7 Sept. 1887] (E). OHIO: Butler Co.: Overholts s.n. [Oxford, 6 June 1910] (E). Cuyahoga Co.: Greenman 1380 (E). Hamilton Co.: Stephenson s.n. [Cincinnati, 18 Oct. 1930] (E). Lorain Co.: Hicks s.n. [Oberlin, June 1895] (E). ILLINOIS: Champaign Co.: H. A. Gleason 718 (G). Cook Co.: M. A. Chase s.n. [Bowmanville, July 7, 1896] (E); Greenman 1877 (E). LaSalle Co.: Thone 50 (E). Madison Co.: Bucholz s.n. [near Alton, 24 July 1927] (E). Richland Co.: Ridgway 2831 (E). Saint Clair Co.: Hertel s.n. [Freeburg, Aug. 1917] (E). INDIANA: Lake Co.: Lansing 2806 (G). IOWA: Black Hawk Co.: Burk 591 (E). Decatur Co.: J. P. Anderson s.n. [July 13, 1903] (E). Story Co.: Bessey s.n. [Ames, Sept. 1873] (G); J. R. Campbell 67 (E, G); A. S. Hitchcock s.n. [Ames] (E). Van Buren Co.: Graves 1691 (E). KENTUCKY: Jessamine Co.: F. T. McFarland 92 (E). Scott Co.: Singer 308 (E). Warren Co.: Price s.n. [Bowling Green, Aug. 1896] (E). TENNESSEE: Knox Co.: Ruth 833 (E). MINNESOTA: Houston Co.: Freiberg s.n. [July 1912] (E). Stearns Co.: Chandonnet s.n. [Collegeville, 29 July 1912] (E). SOUTH DAKOTA: Brookings Co.: Johnson s.n. [1903] (E). Clay Co.: Visher s.n. [Vermilion, 11 Sept. 1911] (E). Davison Co.: Hoffstetter s.n. [Mitchell, July 1903] (E). KANSAS: Riley Co.: J. B. S. Norton 389 (E, G), s.n. [Manhattan, Sept. 1893] (E); Waugh s.n. [16 Aug. 1892] (E). MISSOURI: Butler Co.: Dewart 15 (E). Cass Co.: Broadhead s.n. [24 July 1864] (E). Cole Co.: Knause s.n. [Jefferson City, July 1866] (E). Greene Co.: Dewart 18 (E). Iron Co.: Greenman 3766 (E). Jackson Co.: Bush s.n. [7 Aug. 1893] (E). Jasper Co.: E. J. Palmer 198 (E). Jefferson Co.: A. S. Hitchcock s.n. [Victoria, 6 July 1890] (E); Wislizenus 282 (E). Marion Co.: J. Davis 73 (E), 1274a (E), 3453 (E), 3591 (E), 4450 (E), 4565 (E). McDonald Co.: E. J. Palmer 4229 (E). Miller Co.: Trelease 719 (E). Pike Co.: J. Davis 950 (E). Ralls Co.: J. Davis 3852 (E). Saint Louis Co.: Johnson s.n. [Fern Glen, 14 July 1906] (E); Kellogg s.n. [Allenton, 27 July 1884] (E); Letterman s.n. [Allenton] (E). Taney Co.: Bush 452 (E). Saint Louis: Glatfelter s.n. [St. Louis, 11 Aug. 1894] (E); Kellogg 15277 (E); Riehl 135 (E). ARKANSAS: Clay Co.: Eggert s.n. [near Corning, 21 Aug. 1896] (E). Hempstead Co.: Bush 884 (E); Greenman 4412 (E). LOUISIANA: Lafourche Par.: Guidroz 3 (G). Natchitoches Par.: E. J. Palmer 8000 (E). Rapides Par.: C. R. Ball 556 (E, G). Parish undetermined: Hale s.n. (G). NEBRASKA: Franklin Co.: Laybourne s.n. [Franklin, 1893] (E). Lancaster Co.:

Hedgcock s.n. [Lincoln, Aug. 1899] (E). County undetermined: Hayden s.n. [Dickson's Bluffs on Missouri River, 12 July 1853-4] (E). OKLAHOMA: Choctaw Co.: H. W. Houghton 4015 (G). Comanche Co.: Clemens 11749 (E). Kay Co.: G. W. Stevens 1821 (G). Major Co.: G. W. Stevens 1742 (G). Murray Co.: Emig 716 (E). Payne Co.: Stratton 158 (E). Woods Co.: G. W. Stevens 1673 (E, G). County undetermined: Bush 432 [Arkansas, 23 July 1894] (E). TEXAS: Brazoria Co.: Bush 1482 (E). Dallas Co.: Reverchon 734 (E), s.n. [Dallas, Aug. 1876] (G). Harris Co.: Lindheimer 195 (E). The Aiton 8467, Baker s.n. [St. Croix Falls], Eggleston 4841, Gibbes s.n. [Charleston], Grimes 3794, Rydberg 1716, Schuette s.n. [Green Bay], Small s.n. [Reed Creek], and Visher 2263, which she cites, are all var. leiocarpa Perry & Fernald. The Tracy s.n. from Taylorville, Mississippi, which she cites as "2 Aug. 1903" is probably the collection cited below by me as "[Taylorville, 8/21/1903]". The Britton s.n. which she cites from "NY" is probably the collection cited below as Britton & Britton s.n. in the Columbia University Herbarium; the Riehl 135 which she cites from "NY" is actually in the Meisner Herbarium, while the Britton s.n., Halsted 175, and Torrey 154 which she cites from "NY" are actually all in the Columbia University Herbarium. She says: "Verbena urticifolia is readily distinguished by petiolate and rarely scabrous leaves, remotely flowered slender spikes, and unconnivent fruiting calyces. On account of its close resemblance to V. scabra the two were confused, and V. urticifolia formerly was believed to be native of tropical America. It would now appear to be indigenous in the Middle Eastern States, establishing itself as a weed in various places."

In all, 1828 herbarium specimens and 18 mounted photographs and clippings, including several phototypes and type material of many of the synonyms, have been examined by me.

Citations: QUEBEC: Argenteuil Co.: B. J. Harrington s.n. [St. Andrews, 1867] (Mm—24611); Lucien 1443 (Vi); J. B. McConnell s.n. [July 28, 1870] (Mm—22304); H. N. Moldenke 21736 (Bm, Mm). Beauharnois Co.: Louis-Marie s.n. [13 aout 1955] (Ca—72393). Chambly Co.: A. Dubois s.n. [Chemin de Gentilly, 14 août/30] (N); Marie-Victorin 3124 (Gg—31442, Vi); Marie-Victorin & Rolland-Germain 43528 (Ca—882831, Ob—89437, Um—187). Chateauguay Co.: Lanoutte s.n. [juillet 1934] (Um—182); Marie-Victorin 28087 (Um—194). Chicoutimi Co.: R. Campbell s.n. [St. Anne, September] (Mm—20477). Deux-Montagnes Co.: Louis-Marie 24134 (Um—198), 24187 (Um—199). Iberville Co.: Marie-Victorin & Rolland-Germain 43878 (St—9276, Um—188). Jacques Cartier Co.: "J. C. C." s.n. [St. Laurent] (Vi); Cailloux s.n. [Montréal, 3 octobre 1936] (Um—181); A. F. Holmes s.n. [Côte St. Henri, Aug. 1, 1821] (Mm—360); Kucyniak 55 (Vi);

Mignault s.n. [Ste. Genevieve, 9 aout 1924] (Um--191); Mus. Coll. Ste.-Laurent s.n. (Vi); A. Roy 626 (Vi); E. Roy 113 (Vi). Laprairie Co.: Cléonique 4458 (Vi). Missisquoi Co.: Marie-Victorin, Rolland-Germain, Raymond, & Boivan 4325 (Um--57433). Montmorency Co.: Rolland-Germain 15750 (I, Pl--91769, Um--193, Um--200, Vi). Nicolet Co.: Stanislas 604 (Um--189, Um--190). Outremont Co.: E. Roy 113 (Um--192). Québec Co.: Anselme s.n. [12 juillet 1931] (Um--201, Vi); Cayoutte 49-175 (Vi); Rolland 15750 (N). Richelieu Co.: Marie-Victorin 15749 (Vi). Terrebonne Co.: Rouleau 431 (Um--49239). Vandreuil Co.: E. Roy 3334 (Vi, Vi), 3870 (N, Vi, Vi, W--2096502). Verdun Co.: Vincent s.n. [Eté 1942] (Vi). Ile Ste. Helene [Hochelaga Co.]: Rouleau 1076 (Um--254). ONTARIO: Bruce Co.: R. Campbell s.n. [Chesley, 1886-1911] (Mm--20476). Carleton Co.: Ami 36 (Mm--4647); Minshall 1816 (N); Soper, Calder, Gillett, & Vick 3320 (S). Elgin Co.: G. L. Fisher s.n. [St. Thomas, Sept. 1, 1904] (Ur), s.n. [St. Thomas, July 31, 1906] (B). Essex Co.: Gillman s.n. [Sandwich, August 2, 1869] (Pr). Missisquoi Co.: J. Fowler s.n. [Bedford, Sept. 4, 1893] (W--261025). Norfolk Co.: A. R. Moldenke 1047 (Lw, Lw, Ut). Prescott Co.: Cody & Dore 6574 (Hi--186970). Simcoe Co.: R. F. Cain 424 (Bt--15847). Welland Co.: J. Torrey 154 (C, T). York Co.: C. Skottsberg s.n. [11 Aug. 1913] (S). NEW HAMPSHIRE: Cheshire Co.: H. N. Moldenke 8850 (N). Grafton Co.: Barss s.n. [Hanover, 15 July 1910] (Or--8871); W. V. Brown s.n. [Hanover, Aug. 8, 1939] (H--54385); H. E. Sargent s.n. [Plymouth, 8-17-90] (Ok). Hillsboro Co.: Batchelder 2112 (Dt), s. n. [Petersborough, August 21, 1926] (Dt). Strafford Co.: Hodgdon & Steele 7098 (Dt); Hodgdon & Townsend 6548 (Dt). County undetermined: W. Flint s.n. (Dt). VERMONT: Addison Co.: Collector undesignated s.n. [Middlebury, Aug. 5, 1879] (Vt); Dutton s.n. [Leicester, 8/5/06] (Vt). Bennington Co.: Carpenter s.n. [Arlington, August 27, 1938] (Vt); M. A. Day 147 (Vt, W--348486). Caledonia Co.: F. Blanchard s.n. [Peacham] (Dt). Chittenden Co.: Grout s.n. [Burlington, Aug. 3, 1891] (Vt); Pringle s.n. [Charlotte, 19 Sept. 1878] (Vt), s.n. [Charlotte, 16 August 1883] (Vt). Rutland Co.: Carpenter s.n. [M. S., 7-19-06] (Vt), s.n. [Middletown Spr.] (Vt); Dole 592 (Vt); Eggleston 1531 (Vt), s.n. [Rutland, 8-'90] (Dt). Windham Co.: L. A. Wheeler s.n. [Townshend, 8/23/23] (S). Windsor Co.: W. V. Brown s.n. [Norwich, Aug. 10, 1939] (H--54251); E. M. Kittredge s.n. [Aug. 23, 1921] (N); Loveland s.n. [Norwich, 8-8-1878] (Vt). County undetermined: Herb. Univ. Vermont 9581-9 (Vt); Pringle s.n. [19 Sept. 1878] (Vt). MASSACHUSETTS: Berkshire Co.: G. L. Ames s.n. [Williamstown, July 1857] (Mi); Meredith s.n. [Sept. 10, 1926] (S); Moldenke & Moldenke 11740 (N); Vail s.n. [Aug. 27th 1897] (N); W. A. Weber 1592 (Bl--48173, Io--153003).

Bristol Co.: Blomberg s.n. [N. Easton, July 24, 1902] (Rf), s.n. [August 20, 1904] (S). Franklin Co.: R. E. Torrey s.n. [July 20, 1910] (Ms). Hampden Co.: A. B. Seymour s.n. [Granville, August 1889] (H--106462, H—106588); F. C. Seymour 601 (H—107709, Ms, N). Hampshire Co.: S. C. Brooks s.n. [Amherst, September 5, 1907] (Ca--377696); A. Clark s.n. [Amherst, July 1876] (Ms); Herb. Mass. Agr. Exp. Sta. s.n. [Amherst, July '06] (Ms); Jesup 1957 (Dt). Middlesex Co.: F. S. Beattie s.n. [July 19, 1927] (Or—20958), s.n. [July 23, 1927] (Ok—10370, Ok—10371), s.n. [Lowell, July 28, 1927] (Po—146578), s.n. [Lowell, July 23, 1928] (Es), s.n. [Dracut, July 27, 1929] (Bm); A. H. Clark 113 (Gg—31440); Cushman s.n. [Middlesex Fells, July '89] (Up--69672); G. B. Grant 805 [1989; 3058] (Po—267669); Grover s.n. [July 20, 1895] (Ob—50845); M. L. Loomis 1426 (W—985701); Lyman s.n. [Cambridge] (Dt); F. C. Seymour s.n. [Waverley, July 22, 1908] (H—107710); K. M. Wiegand s.n. [July 23, 1912] (Go). Norfolk Co.: Lourteig 1719 (S); K. M. Wiegand 2061 (Io—127768). Worcester Co.: W. V. Brown 3094 (Au); Goodale, Markert, & Piper 55641 (H—106460). Martha's Vineyard: Mackeever MV.254 (G, N, Ot, S, Up). RHODE ISLAND: Newport Co.: Collins, Spaulding, & Eravatt s.n. [28 Sept. 1916] (Vi). Block Island: P. Spaulding s.n. [Block Island, Sept. 28, 1916] (Gg--31443). CONNECTICUT: Fairfield Co.: H. C. Beardslee s.n. [Monroe] (Ob--50855); Herb. Univ. Calif. 199068 (Ca); Langlois s.n. [8-22-89] (N); C. L. Pollard 233 (W--309641). Hartford Co.: M. Brandegee s.n. [Berlin] (Ca--468125); H. C. Cowles s.n. [Sept. 9, 1892] (Ob--50848). Litchfield Co.: S. L. Clarke s.n. [Washington, July '92] (N); Dwyer 2468 (N). Middlesex Co.: Barratt s.n. [1839] (T), s.n. [Middletown, 1840] (S). New Haven Co.: Kleeberger s.n. [New Haven, Aug. 1874] (Gg--31439). New London Co.: Jansson s.n. [July 26, 1927] (S), s.n. [Groton, Aug. 16, 1928] (Or--22020), s.n. [Groton, Sept. 2, 1929] (Go), s.n. [North Stonington, Aug. 12, 1952] (Go); W. A. Setchell s.n. [Norwich, July 28, 1883] (Ca—25190). Tolland Co.: M. T. Travis 1948 (Up). Windham Co.: J. L. Sheldon s.n. [Central Village, July 1897] (We). County undetermined: A. Gray s.n. [Conn.] (S); Krebs s.n. (Cp); C. Wright s.n. (Cm). NEW YORK: Albany Co.: H. D. House 26892 (Al); Whitney 1911 (Al). Allegany Co.: A. R. Moldenke 1053 (Lw), 1055 (Lw). Bronx Co.: Ahles 581 (Aa), 653 (Aa); Clute s.n. [Pelham Park, July 12, 1899] (N); H. M. Denslow s.n. [High Bridge, July 1864] (Ms); T. W. Edmondson 2519 (N); Gilly 110 (N). Cattaraugus Co.: Alexander & House 13023 (Al); A. R. Moldenke 1052 (Lw). Chautauqua Co.: F. W. Johnson 1329 (N). Chenango Co.: E. E. Davis 83 (Al). Columbia Co.: R. McVaugh 1408 (Al, Up), 14767 (Mi). Delaware Co.: P. Wil-

son s.n. [Arkville, July 26, 1915] (N). Dutchess Co.: J. M. Fogg 7407 (Up); Moldenke & Moldenke 19528 (Sm); Sherwood s.n. [Pawling, Aug. 5] (Sh, Sh, Sh, Sh, Sh, Sh, Sh), s.n. [Pawling, Aug. 10] (Sh, Sh, Sh), s.n. (Sh). Genesee Co.: E. J. Hill 134.1855 (Ur); Muenscher & Brown 21404 (It); W. H. Rhoades s.n. [Buttermilk Falls, Aug. 8, 1915] (Hs). Greene Co.: F. W. Johnson s.n. [Windom, June 25, 1921] (N); N. Taylor 1294 (N). Jefferson Co.: Hotchkiss 873 (Al). Madison Co.: H. D. House 13648 (Al); Maxon s.n. [vicinity of Oneida, July 22, 1895] (W—674568). Monroe Co.: Barss s.n. [Rochester, 7 September 1909] (Or—8873); Baxter s.n. [near Rochester, August 1925] (Ca--882834); Holger s.n. [July 1863] (Al); W. A. Matthews 3272 (Hi—29811, La); A. R. Moldenke 9 [H. N. Moldenke 20437] (N, No). Nassau Co.: H. N. Moldenke 19050 (N, Or); W. A. Weber 933 (Bl—48170, Io--150189). Niagara Co.: E. C. Townsend s.n. [Aug. 1890] (Pl—86886). Oneida Co.: Haberer s.n. [6-24-1886] (Al). Onondaga Co.: G. T. Hastings s.n. [Tully Lake, July 31, '95] (N). Ontario Co.: A. R. Moldenke 7 [H. N. Moldenke 20435] (Mr, Mr). Orange Co.: Bohus-Jensen & Moldenke 41 (Jn); H. M. Denslow s.n. [Aug. 10, 1922] (N); W. H. Lewis Jr. s.n. [Tuxedo Park, Jy. 27, '99] (N); Lucian 406 (Wl); Raup 7603 (Mi). Orleans Co.: Lennon s.n. [July 1893] (Al). Oswego Co.: Hotchkiss 3314 (Al); C. S. Sheldon s.n. [July 13, 1878] (Al). Putnam Co.: Moldenke & Moldenke 11852 (N). Queens Co.: Hexamer & Maier s.n. [Little Bayside, July 9, '53] (Cm); L. Johnson s.n. [Fresh Pond, July 18, 1876] (Lh); Poggenburg s.n. [Flushing, July 11, '86] (Tc). Rensselaer Co.: Banker 1438 (N); Puissant s.n. (Br). Rockland Co.: Lehr 435 (N). Saint Lawrence Co.: Mrs. O. P. Phelps 800 (Gg—31441). Saratoga Co.: J. M. Fogg 7132 (Up). Schenectady Co.: H. D. House 23747 (Al). Steuben Co.: A. R. Moldenke 12 [H. N. Moldenke 20463] (N). Suffolk Co.: Banker 3020 (N); J. A. Harris C.15997, in part (Ca—610148); L. K. Henry s.n. [Wading River, July-Aug. 1928] (Cm). Tompkins Co.: L. H. Bailey s.n. [near Ithaca, Aug. 25, 1925] (Ba, Ba); W. C. Baker s.n. [Ithaca, 1905] (Ba); Clovis s.n. [September 1952] (We); Greenfield s.n. [July 1931] (N); Hoisington 74 (Ok—15639); Laird s.n. [July 17, 1917] (Ms); B. Maguire 6661 (Ua—26813); A. R. Moldenke 4 [H. N. Moldenke 20427] (N), 1069 (Lw); Muenscher & Bechtel 526 (Ca--882835, Io--112239, Pl--63399, Ur); Munz 616 (Ca--882842, Po—64682); Naylor & Smith s.n. [Ithaca, 8-8-1924] (Bt—37674); E. L. Palmer 1013 (S); O. E. Pearce s.n. [Six Mile Creek, July 26, 1885] (W--218875); C. H. Peck s.n. [Freeville] (Al); "J. M. R." s.n. [July 26, 1926] (Gu—E.1055); Rendle s.n. [McClean, Aug. 16, 1926] (Bm); C. Skottsberg s.n. [17/8/1926] (Go). Ulster Co.: Elting 2074 (Al); J. M. Fogg 7123 (Up); H. D. House

24924 (Al). Warren Co.: H. D. House 30092 (Au). Washington Co.: S. H. Burnham s.n. [August 1912] (Al); Dobbin 234 (Al); A. Fitch s.n. [East Greenwich, 1865] (Mi); H. D. House 23874 (Al), 28329 (Al, Ca--882840). Westchester Co.: J. H. Barnhart 333 (N), 1484 (N); H. A. Gleason Jr. 1488 (Go, N, S); Herb. N. Y. Bot. Gard. s. n. [July 18, 1896] (N), s.n. [August 8, 1896] (N); A. R. Moldenke 21 [H. N. Moldenke 21120] (B, Fy, N, Rs); Moldenke & Acuña 19503 (Es); Waxenbaum 1281 (Wx). Yates Co.: Clovis s.n. [September 28, 1952] (We); S. H. Wright s.n. (Mm--15402). Staten Island [Richmond Co.]: Billberg s.n. [Staten Island, 1826] (S); H. N. Moldenke 19122 (N, Or, Si); W. A. Weber 207 (Bl--48172, Io--150808). County undetermined: Collector undesignated 1525 (N); Herb. Jard. Bot. Brux. s.n. [Long Island, July 24, '67] (Br); Ottley 16595 (Kr); J. Torrey 747-0 (Al), s.n. (C, Pa). NEW JERSEY: Bergen Co.: Dautun s.n. [Cresskill, Aug. 13, 1903] (La), s.n. [Cherry Hill, 1 aout 1908] (La); Oehler s.n. [1877] (N). Burlington Co.: J. M. Fogg 9240 (Up). Cape May Co.: W. Stone 16316 (Up). Cumberland Co.: J. W. Adams 883 (Up, We). Essex Co.: Lighthipe s.n. [East Orange, Aug. 4, 1914] (Au), s.n. [East Orange, Aug. 7, 1917] (N). Hudson Co.: L. H. Bailey s.n. [Hoboken, Aug. 18, 1920] (Ba); Billberg s.n. [Hoboken, 1826] (S). Hunterdon Co.: A. R. Moldenke 46 [H. N. Moldenke 21769] (Bm). Mercer Co.: Collector undesignated s.n. [Aug. 2, 1876] (Pr), s.n. (Pr). Middlesex Co.: B. D. Halsted 175 (Ah, C, Fc, Io--15354, Mi, Ua--11393, Ua--27136, Ur, Vt, We); L. H. Pammel s.n. [Perth Amboy, Sept. 3, '24] (Io--116602); Vail s.n. [New Brunswick, July 18th 1890] (N). Monmouth Co.: R. C. Alexander s.n. [Redbank, 14 July '64] (Ca--379999); H. N. Moldenke 21718 (Mm, Sm). Morris Co.: N. L. Britton s.n. [Green Pond, Sept. 21, 1886] (C). Passaic Co.: E. W. Berry s.n. [Passaic, July 1894] (Tc); G. V. Nash 476 (Br, Lh). Salem Co.: J. M. Fogg 10011 (Up). Somerset Co.: Lavoie 403 (Vi); Lighthipe s.n. [Rocky Hill, Aug. 1, 1916] (Au, N); A. R. Moldenke 18 [H. N. Moldenke 20387] (N, Wh); H. N. Moldenke 1330 (E, Go, H--5483, N, N, N, S, Up, Ur), 2627 (N), 7401 [Pl. Vic. N. Y. City 41] (Go, N, Um--183, Ur), 8092 (Go, N, N, S, Ur); Moldenke & Moldenke 11687 (Go, N). Sussex Co.: H. N. Moldenke 21539 (Ss); H. H. Rusby s.n. [Franklin, Aug. 1879] (Mn--16103). Union Co.: H. N. Moldenke 21885 (B). PENNSYLVANIA: Adams Co.: J. M. Fogg 13598 (Up), 15216 (Up). Allegheny Co.: A. Dubois 337 (N), 351 (N); O. E. Jennings s.n. [Aug. 1, 1918] (Cm); Millward s.n. [Wildwood, July 29, 1919] (Cm); Van Dersal 303a (Cm, Up). Armstrong Co.: J. M. Fogg 15338 (Up). Beaver Co.: Andriessen s.n. [July 1881] (Cm); Graham & Graham s.n. [7/29/23] (Cm). Bedford Co.: O. E. Jennings s.n. [8/10/1941] (Cm). Berks

Co.: J. M. Fogg 5826 (Up); H. N. Moldenke 19371 (N). Bradford Co.: H. A. Wahl 16802 (Hi--168732); Westerfeld 919 (Cm). Bucks Co.: H. R. Bassler s.n. [July 27, '79] (Ka). Butler Co.: Bright s.n. [Plains Church, Aug. 2, 1924] (Cm); H. W. Graham s.n. [Buhl, 8/28/22] (Cm); L. K. Henry 552 (Ca--882839, Hi--192854, W--1810936); O. E. Jennings s.n. [Valencia, Sept. 27, 1904] (Cm); N. Russell H.3322 [NR-1986] (We). Cambria Co.: O. E. Jennings 52 (Cm), s.n. [Flinton, 7/24/08] (Cm). Cameron Co.: J. M. Fogg 18177 (Up); O. E. Jennings s.n. [Emporium, July 21, 1904] (Cm). Centre Co.: O. E. Jennings s.n. [7/16/09] (Cm); A. R. Moldenke 787 (Lw). Chester Co.: J. M. Fogg 5772 (Up). Clarion Co.: O. E. Jennings s.n. [Red Bank, July 21, 1904] (Cm); H. N. Moldenke 21899 (Lw). Clearfield Co.: Westerfeld 23 (Cm). Columbia Co.: H. N. Moldenke 21892 (Lw, Ut). Crawford Co.: C. D. Curtis s.n. [Meadville, Aug. '93] (Po--65182); Shafer s.n. [July 23, 1901] (Cm, Cm). Cumberland Co.: A. R. Moldenke 45 [H. N. Moldenke 21768] (Bm), 98 (Fg). Delaware Co.: Brinton s.n. [Wawa, Aug. 29, 1888] (Up--17127); E. C. Earle 1510 (Up); J. M. Fogg 5704 (Up); W. M. Thompson Jr. 352 (Up). Erie Co.: N. H. Phillips 86 (Up). Franklin Co.: A. R. Moldenke 42 [H. N. Moldenke 21765] (Bm), 43 [H. N. Moldenke 21766] (Bm, Gg, Mi); Tidestrom 7334 (W--754054). Greene Co.: O. E. Jennings s.n. [9/9/21] (Cm); Lohr 236 (Up). Huntingdon Co.: E. H. Graham s.n. [7/12/32] (Cm, Up, Up). Indiana Co.: O. E. Jennings s.n. [July 11, 1908] (Cm). Jefferson Co.: H. N. Moldenke 21898 (Lw). Juniata Co.: J. M. Fogg 15537 (Up). Lancaster Co.: Brubaker 59 (Up), 88 (Up), 856 (Up), 923 (Up), 986 (Up), 1496 (Up); A. A. Heller s.n. [Lancaster, August 29, 1900] (W--407056); J. K. Small 106 (Ob--50853). Lawrence Co.: Jennings & Kennedy s.n. [Sept. 18, 1919] (Cm). Lebanon Co.: C. H. Kauffman s.n. [Aug. 1889] (Mi). Lehigh Co.: Arndt s.n. [Allentown, July 1911] (Up); O'Neill s.n. [Cedar Creek, August 19, 1927] (Fl--21130, I). Luzerne Co.: J. K. Small s.n. [Lily Lake] (Cp). Lycoming Co.: Gress, Jennings, & Jennings s.n. [Cedar Run, Sept. 2, 1920] (Cm); W. H. Rhoades s.n. [near Williamsport, Aug. 1937] (N); W. R. Taylor s.n. [Essick Heights, 1912] (Up--68767). Monroe Co.: Bernhardt s.n. [Paradise Falls, Sept. 10, 1928] (Up); G. B. Grant 7129 (Po--267626); Langman 94 (Up). Montgomery Co.: J. M. Fogg 9140 (Up); A. R. Moldenke 103 (Fg); V. Wismer 405 (Up), 424 (N, Up). Northampton Co.: R. L. Schaeffer 9450 (Au--122815); Tyler s.n. [Easton, Aug. 7, 1896] (N). Northumberland Co.: J. M. Fogg 17687 (Up), 18013 (N); A. R. Moldenke 13 [H. N. Moldenke 20474] (N); M. T. Travis 2296 (Up). Perry Co.: J. M. Fogg 17922 (Up); A. R. Moldenke 16 [H. N. Moldenke 20487] (N). Philadelphia Co.: J. W. Adams 446 (Up); Brinton s.n. [8.9.1878] (Pl--115520); J. M.

Fogg 16194 (Up), 16244 (Up); J. M. Greenman 1374 (Or--14318); H. A. Lang 514 (Up); MacElwee 882 (Ka--71128, N, S, Um--197), s.n. [West Philadelphia, Sept. 4, 1895] (N). Pike Co.: Graham & Henry s.n. [July 1930] (Cm). Schuylkill Co.: J. M. Fogg 11475 (Up); P. R. Wagner 686 (Up). Snyder Co.: A. R. Moldenke 15 [H. N. Moldenke 20485] (S); Wade & Wade 1434 (Up). Somerset Co.: J. M. Fogg 15266 (Up), 15280 (Up); O. E. Jennings s.n. [Keystone, Oct. 9, 1904] (Cm). Sullivan Co.: F. R. Fosberg 15778 (Up); W. Stone 15168 (Up). Warren Co.: H. N. Moldenke 15426 (We), 17983 (Br). Washington Co.: J. M. Fogg 18354 (Up); L. K. Henry s.n. [9/26/40] (Cm); D. Wilson 152 (We). Westmoreland Co.: Demoise s.n. [9/1/35] (Cm), s.n. [7/26/36] (Cm); L. K. Henry s.n. [7/28/41] (Cm); K. R. Holmes s.n. [Salina, July 15, 1902] (Cm); A. R. Moldenke 102 (Fg); H. N. Moldenke 19366 (N). Wyoming Co.: Osterhout s.n. [Tunkhannock, July 18, 1929] (Po--173426). York Co.: J. M. Fogg 12643 (Up); K. B. Hoover 4034 (Hi--196036). County undetermined: Schweinitz s.n. [1829] (Br). DELAWARE: New Castle Co.: Canby s.n. [Sept. 28, 1896] (Pl--22611). Sussex Co.: Lafferty s.n. [July 1865] (Pr). MARYLAND: Allegany Co.: Ahles & Gilpin 8182 (Ur). Baltimore Co.: Boldo 62 (Q); Jones & Ridgway s.n. [Aug. 15, 1903] (Mn--6891). Calvert Co.: Tidestrom 7797 (I). Carroll Co.: M. J. Fisher 121 (Up); A. R. Moldenke 495 (Fg). Dorchester Co.: C. P. Smith 2936 (I). Howard Co.: Arsène 724 (Or--14678); A. R. Moldenke 494 (Fg). Kent Co.: H. N. Moldenke 13869 (Z). Montgomery Co.: Ewan 17144 (Tl, Tl). Prince Georges Co.: Hyacinth 1644 (Or--14730); A. R. Moldenke 493 (Fg); Petrak s.n. [6.VIII.1950] (S); Tidestrom 14482 (I); True 564 (Up). Talbot Co.: E. C. Earle 1734 (Up). Washington Co.: A. R. Moldenke 39 [H. N. Moldenke 21760] (Bm). Worcester Co.: C. E. Moldenke s.n. [H. N. Moldenke 6638] (N). DISTRICT OF COLUMBIA: F. Blanchard s.n. [Sept. 20, 1890] (Dt), s.n. [near Long Bridge, 11 July 1891] (N); Boettcher 226 (Ca--162475); J. H. Holmes s.n. [1888] (Ka); Lenander s.n. [Washington, Juli 27, 1933] (S); W. H. Seaman s.n. (Mn--15404); E. S. Steele s.n. [July 7, 1896] (Ob--50850). VIRGINIA: Albemarle Co.: H. N. Moldenke 19225 (N, Si). Augusta Co.: Murrill s.n. [12 July 1895] (N). Bedford Co.: Curtiss s.n. [August 3, 1872] (S). Botetourt Co.: A. R. Moldenke 65 [H. N. Moldenke 21790] (Bm, Gg). Craig Co.: J. M. Fogg 13149 (Up). Fairfax Co.: J. J. Carter s.n. [Falls Church, July 1876] (Tl); A. R. Moldenke 497 (Fg). Fauquier Co.: A. R. Moldenke 66 [H. N. Moldenke 21791] (Bm). Giles Co.: J. M. Fogg 12772 (Up), 14787 (Up). Gloucester Co.: A. R. Moldenke 488 (Fg). James City Co.: Artz 1161 (We, We). King William Co.: A. R. Moldenke 487 (Fg). Loudoun Co.: A. R. Moldenke 67 [H. N. Moldenke 21792] (Bm, Gg). Montgomery Co.: R. Kral 11160 (Hi—215372). Nor-

folk Co.: A. R. Moldenke 474 (Fg, S). Northumberland Co.: A. R. Moldenke 486 (Fg). Orange Co.: Nason s.n. [Gordonsville, July 1867] (Ur). Prince William Co.: A. R. Moldenke 496 (Fg). Pulaski Co.: A. R. Moldenke 61 [H. N. Moldenke 21786] (Bm). Roanoke Co.: A. R. Moldenke 63 [H. N. Moldenke 21788] (Bm); C. E. Wood 3284 (Ca--772814), 6248 (Hi--51276). Rockbridge Co.: A. R. Moldenke 64 [H. N. Moldenke 21789] (Bm). Rockingham Co.: H. N. Moldenke 19226 (N). Smyth Co.: A. R. Moldenke 59 [H. N. Moldenke 21784] (Bm); J. K. Small s.n. [Marion, July 20, 1892] (Ba, Ob--50846, We). Washington Co.: A. R. Moldenke 57 [H. N. Moldenke 21782] (Bm, Gg). Alexandria: A. R. Moldenke 498 (Fg). County undetermined: Herb. Mus. Bot. Stockholm s.n. (S); Herb. Retzius s.n. (Lu). WEST VIRGINIA: Braxton Co.: R. Harris s.n. [August 4, 1933] (We). Brooke Co.: E. A. Bartholomew B.1937-11 (We). Calhoun Co.: R. Harris 106 (We), s.n. [June 26, 1933] (We). Gilmer Co.: G. B. Rossbach s.n. [10/12/52] (We). Greenbrier Co.: E. E. Smith s.n. [August 3, 1947] (We). Harrison Co.: Judy s.n. [summer 1934] (We). Jackson Co.: West Va. Bot. Exped. s.n. [June 25, 1930] (Bt-25425). Jefferson Co.: A. R. Moldenke 41 [H. N. Moldenke 21763] (Bm). Kanawha Co.: Greenlee s.n. [Aug. 12, 1934] (We); F. C. Randolph 227 (We). Lewis Co.: Mrs. V. Arnold s.n. [July 18, 1954] (We). Marion Co.: Herb. West Va. Univ. s.n. (We); A. Vincent s.n. [Valley Falls, June 27, 1957] (We). Marshall Co.: E. A. Bartholomew M.285 (We). Mineral Co.: M. Brown s.n. [August 23, '50] (We). Monongalia Co.: Anderson & Smith 360 (We); Sheldon s.n. [State Farm, 7/28/14] (We), s.n. [State Farm] (We). Ohio Co.: E. Drummond s.n. [October 1937] (Cm); Strausbaugh 344 (We). Pendleton Co.: R. B. Clarkson 1395 (We); E. L. Core 3188 (Ob--50851), 6131 (We); Netting 117 (Cm). Preston Co.: J. Myers s.n. [July 26, 1937] (We). Randolph Co.: E. L. Core 6241 (We). Roane Co.: E. A. Bartholomew Ro-20 (We). Taylor Co.: Constable s.n. [Dry Run, 7/21/59] (We). Tucker Co.: A. H. Moore 2110 (Ca--159478, Gg--31436). Tyler Co.: Bartholomew & Wilson T.275 (We). Upshur Co.: Grose & Grose s.n. [Sago, August 20, 1946] (We); W. M. Pollock s.n. [July 13, 1895] (W--261415). Wayne Co.: Lycan 72 (We). Wirt Co.: E. A. Bartholomew 73 (We), 1935-73, in part (We), s.n. [Aug. 28, 1932] (We), s.n. [6/9/33] (We), s.n. [June 20, 1934] (We). Wyoming Co.: West Va. Biol. Exped. s.n. [July 9, 1929] (H--26357). NORTH CAROLINA: Alamance Co.: Ahles & Bell 16843 (Hi--92729, Hi--92730). Anson Co.: Ahles & Leisner 19495 (Hi--92731, Hi--92732). Avery Co.: Britton & Britton s.n. [Cranberry Station, Sept. 13, 1885] (C). Bertie Co.: Ahles & Duke 46167 (Hi--121523, Hi--121524); D. S. Correll 1987 (H--40245, N). Burke Co.: D. S. Cor-

rell 3088 (H—40284). Cabarrus Co.: Ahles & Leisner 19711 (Hi—92735). Camden Co.: D. S. Correll 2212 (H—9109); A. R. Moldenke 473 (Fg, S). Caswell Co.: C. R. Bell s.n. [July 29, 1958] (Hi—121522); Oosting 33399 (H—18205). Catawba Co.: C. R. Bell s.n. [Sept. 8, 1958] (Hi—146191). Chatham Co.: Houck 309 (Hi—90514, Hi—92888). Cherokee Co.: D. S. Correll 3559 (H—40251). Chowan Co.: Ahles & Duke 47960 (Hi—104429). Cleveland Co.: Ahles & Leisner 19143 (Hi—92734). Davie Co.: D. S. Correll 2739 (H—40248); A. E. Radford 14848 (Hi—92889). Edgecombe Co.: D. S. Correll 2440 (H—40240). Forsyth Co.: Ahles & Duke 49010 (Hi—111296); D. S. Correll 2592 (H—19847); P. O. Schallert s.n. [7/1/33] (Du—236986). Gates Co.: Ahles & Duke 44554 (Hi—110654). Granville Co.: Buell 1438 (No—8602, W—1654110). Greene Co.: D. S. Correll 1368 (H—40252). Guilford Co.: Melvin s.n. [Aug. 1955] (Hi—92891). Halifax Co.: Ahles & Leisner 17005 (Hi—92892). Haywood Co.: Ahles & Duke 50251 (Hi—112965); R. A. McLean 98 (We); A. R. Moldenke 51 [H. N. Moldenke 21775] (Bm); Oosting 34401 (Ob—70422); Smathers 57 (N). Henderson Co.: Memminger s.n. [July 30, 1885] (Hi—49537); Oosting 35487 (H—31533). Iredell Co.: C. F. Hyams s.n. [Statesville] (Vt). Jackson Co.: C. W. Galloway 3101 (Hi—92738). Lee Co.: Houck 387 (Hi—92393). Madison Co.: Ahles & Duke 46352 (Hi—121525). Martin Co.: A. E. Radford 39443 (Hi—110655). McDowell Co.: C. R. Bell 4505 (Hi—92894). Mecklenburg Co.: Ahles & Duke 48501 (Hi—112968, Hi—112969, Hi—112970); D. S. Correll 3030 (H—9082). Mitchell Co.: Ahles & Duke 47078 (Hi—104474). Montgomery Co.: Ahles & Leisner 16305 (Hi—92741). Orange Co.: Blomquist 4713 (H—20439); W. C. Coker s.n. [Sept. 19, '09] (Hi—59477); Radford & Stewart 199a (Hi—12595). Pasquotank Co.: Ahles & Duke 48075 (Hi—104472). Person Co.: Duke 351 (Hi—92742). Polk Co.: D. S. Correll 3243 (H—40239); Peattie 611 1/2 (Hi—59480); E. C. Townsend s.n. [7.20,1899] (Se—14945). Randolph Co.: Millsaps s.n. [Aug. 13, 1932] (Hi—3256). Richmond Co.: A. E. Radford 14475 (Hi—92897). Rockingham Co.: A. E. Radford 13604 (Hi—92899). Rowan Co.: D. S. Correll 2801 (H—40247); A. E. Radford 14288 (Hi—92898). Stanly Co.: Ahles & Leisner 19855 (Hi—92745, Hi—92746). Surry Co.: A. E. Radford 18377 (Hi—92900). Swain Co.: A. R. Moldenke 52 [H. N. Moldenke 21776] (Bm). Transylvania Co.: D. S. Correll 3398 (H—40249). Tyrrell Co.: A. E. Radford 39167 (Hi—104467). Union Co.: Ahles 34050 (St); Ahles & Haesloop 31462 (Hi—104465). Vance Co.: Ahles & Leisner 17215 (Hi—92748). Wake Co.: Brimley 78 (No—8601). Watauga Co.: Ahles & Duke 47718 (Hi—104463). Wilson Co.: A. E. Radford 38065 (Hi—104462). Yadkin Co.: A. E. Radford 15388 (Hi—92803). County undetermined: Ashe s.

n. [July 19] (Hi--59484). SOUTH CAROLINA: Abbeville Co.: A. E. Radford 25919 (Hi--92728). Anderson Co.: J. Davis s.n. [Anderson, 8-7-19] (Au); A. E. Radford 14027 (Hi--92886). Cherokee Co.: Ahles & Haesloop 31004 (Hi--104427). Greenwood Co.: A. E. Radford 26647 (Hi--92737). Lexington Co.: A. E. Radford 27036 (Hi--92739). Marlboro Co.: A. E. Radford 15516 (Hi--92895). Union Co.: Ahles & Haesloop 31462 (Hi--104466). York Co.: Ahles & Haesloop 31144 (Hi--104458, Hi--104459). Witherspoon Island [Darlington Co.]: B. E. Smith 1007 (Hi--26475). GEORGIA: Bartow Co.: W. H. Duncan 8535 (Gu--30152). Clarke Co.: Drury s.n. [June 3, 1929] (Gu--U.6650); Holder E.8338 (Gu), s.n. [Athens, July 7, 1929] (Up); Miller & Maguire 1261 (Ua--16576), 1263 (Ba); Pyron s.n. [Athens, July 12, 1929] (H--5482). Richmond Co.: Cuthbert s.n. [Augusta, July 25, 1900] (Fl--21129). Thomas Co.: Mrs. A. P. Taylor s.n. [Thomasville, July 28, '03] (Rf), s.n. [Thomasville, Sept. 1903] (Rf). FLORIDA: Manatee Co.: S. M. Tracy 6652 (W--383904). Pasco Co.: C. Jackson 626 (Rf). ALABAMA: Baldwin Co.: S. M. Tracy 8037 (Au, N, N, Tr, Tr, Tr, Up--50918, W--513695). DeKalb Co.: Moldenke & Woods 502 (S). MISSISSIPPI: Claiborne Co.: Moldenke & Woods 526 (S). Leflore Co.: Moldenke & Woods 511 (S). Smith Co.: S. M. Tracy s.n. [Taylorville, 8/21/1903] (N). Sunflower Co.: Moldenke & Woods 510 (S). Tallahatchie Co.: Moldenke & Woods 506 (B, S). Warren Co.: Demaree 25493 (Sm). Yazoo Co.: Moldenke & Woods 516 (S). OHIO: Belmont Co.: Guttenberg 251 (Cm). Butler Co.: M. Miller s.n. [July 7, 1932] (Ob--80602); Wehmeyer & Waters 111 (Mi). Champaign Co.: Demaree 11704 (Bt--30394, Ca--591979, Du--240704, N, W--1632196); Jewett s.n. [Urbana, July 28, 1838] (Mi); E. C.Leonard 1608 [Herb. Leonard 4352] (W--2161287); A. R. Moldenke 797 (Lw). Clark Co.: F. P. Davidson s.n. [Springfield, July 1885] (Or--8872). Coshocton Co.: Madison s.n. (Co--109); H. N. Moldenke 12095 (Co--394). Darke Co.: A. R. Moldenke 800 (Lw). Delaware Co.: R. Crane 2444 (N), 2506 (N). Erie Co.: C. L. Booth s.n. [August 2, 1901] (Ob--75335). Hamilton Co.: Aiken 10693 (Ll), s.n. [VII-17-1905] (Po--267664); E. L. Braun s.n. [July 24, 1917] (Cn); R. Buchanan s.n. (Ll); J. Clark s.n. [Cincinnati] (Bm, Bm); Frank s.n. [1837] (Br); C. G. Lloyd s.n. [Sedamsville, July 1875] (Cn), s.n. [July 24, 1882; Herb. Prager 18635] (Gg--31434), s.n. [July 31, 1882] (Mi), s.n. [Cincinnati, July 25, 1883] (Ca--192071, Go); M. Mohr 466 (Ll). Harrison Co.: A. R. Moldenke 788 (Lw, Ut). Holmes Co.: H. N. Moldenke 12104 (Co--401). Knox Co.: A. R. Moldenke 791 (Lw). Lake Co.: H. C. Beardslee s.n. [Aug. 3, 1925] (Ob--97296), s.n. [Madison] (Ob--97295). Licking Co.: H. L. Jones s.n. [Aug. 4, 1889] (Ob--80603). Lorain Co.: M. E. Day 221 (Ob--99797); Dick

s.n. [Oberlin, July 27, 1894] (Mn--18492); F. E. Leonard 86/8 (Ob--75341), s.n. [July 20, 1896] (Um--184); E. W. Phillips s.n. [Rochester, 8/8/1892] (Cm); A. E. Ricksecker s.n. [Elyria, Aug. 1, '94] (W--217441); A. A. Wright s.n. [July 30, 1889] (Ob--75342, Ob--75343), s.n. [Aug. 1, 1889] (Ob--75344). Lucas Co.: Sanford 1957 (S). Meigs Co.: C. H. Jones s.n. [July 10, 1935] (N). Miami Co.: Clevenger s.n. [Fletcher, Aug. 13, 1897] (W--1524139); A. R. Moldenke 799 (Lw). Montgomery Co.: H. P. Smith 1957 (Dt). Ottawa Co.: R. H. Moore s.n. [Oak Harbor, July 1927] (Ok--10355), s.n. [Oak Harbor, 1927] (Ok--10354). Richland Co.: E. Wilkinson 8467 (Cm, Ob--80604, Ob--80605), s.n. [Aug. 1888] (Ob--80606). Ross Co.: Crowl 556 (N). Scioto Co.: Demaree 11518 (Ca--592048). Tuscarawas Co.: T. S. Hopkins s.n. [Dundee, Aug. 1911] (Cm, Cm). Union Co.: A. R. Moldenke 793 (Lw, Ut). Warren Co.: F. A. Bennett s.n. [July 16, 1884] (Cm). Wayne Co.: L. S. Hopkins s.n. [6/25/11] (Br), s.n. [7/3/11] (Br); Thorne s.n. [Wooster, Aug. 17/97] (Fc). ILLINOIS: Adams Co.: Brinker 2717 (Il--15819, Ur), 3489 (Il--15814), 3512 (Il--15813, Ur); Evers, Jones, & Jones 692 (N, Ur); A. B. Seymour s.n. [Camp Point, 19 Aug. 1876] (H--106461). Brown Co.: V. H. Chase 12760 (Ur, Ur, Ur, Ur). Cass Co.: Ahles 2940 (Ur). Champaign Co.: Evers 1484 (Ur); Fink s.n. [Champaign, Aug. 16, 1892] (Io--28700); G. N. Jones 12439 (Ur), 12647 (Ur), 12829 (Ur), 14059 (Ur), 16528 (Ur), 17554 (Ur); McDougall 95 (Ur); Snyder s.n. [Urbana, July 1881] (Sd--4250). Christian Co.: DeMott s.n. [Taylorville, 8/4/96] (Ur). Clark Co.: G. D. Fuller 10978 (Il--19301). Coles Co.: V. A. Anderson 12595 (Il--20714); G. D. Fuller 10700 (Il--21849). Cook Co.: H. H. Babcock 9282 (Bz--23793), s.n. [Jul. 13, 1814] (Sg--16116); Bakker s.n. [Gardner's Park, Sept. 1912] (Sd--12804); R. Bebb 2107 (Ok); H. R. Bennett s.n. [August 17, 1957] (Go), s.n. [August 31, 1957] (Go); Blatchford 2515, in part (Il--15820); M. A. Chase s.n. [July 26, 1895] (Ur), s.n. [Bowmanville, July 7, 1896] (Ur, Ur); Fuller & Link 182 (Il--15833); Lansing 1441 (Ur), 2806 (Ur); W. S. Moffatt 575 (Se--95719); Umbach 1303 (Ca--441515). Crawford Co.: Ahles 4939 (Ur). Cumberland Co.: Ahles 2574 (Ur); Winterringer 6071 (Il--33426). DeKalb Co.: P. B. Whitford s.n. [July 19, 1946] (Ur). Douglas Co.: Winterringer 608 (Ur). Du Page Co.: G. D. Fuller 1355 (Il--15832); W. S. Moffatt 293 (Ur), 575 (Ur); Umbach s.n. [Naperville, July 22, 1898] (W--339481). Edgar Co.: A. R. Moldenke 809 (Lw). Effingham Co.: Ahles 2623 (Ur). Fayette Co.: O'Dell 337 (Ur). Hancock Co.: F. C. Gates 9948 (Ur). Iroquois Co.: Ahles 3211 (Ur); Winterringer 6538 (Il--34122). Jackson Co.: Fuller & Welch 295 (Il--15842). Jefferson Co.: Ahles 5468 (Ur); Winterringer 7803 (Il--37756). Jo Daviess Co.: Ahles 4344 (Ur); Winterringer 8157 (Il--37457). Kanks-

kee Co.: E. J. Hill 242.1873 (Ur, Ur); G. N. Jones 15926 (Ur). Lake Co.: R. Bebb 1681 (Ok); Umbach 5857 (Ca--441516, Ka). La Salle Co.: G. D. Fuller 1796 (Il--15834); D. T. Ries 7594 (Il--15818); Thone 50 (Ur); P. B. Whitford 310 (Il--32223). Lawrence Co.: Sivert s.n. [July 25, 1952] (Ur). Lee Co.: Keithley 288 (Il--31490), s.n. [July 30, 1946] (Ur); Lyman s.n. [Amboy, 8-16-94] (Dt). Livingston Co.: G. D. Fuller 9138 (Il--15815). Logan Co.: Winterringer 511 (Ur). Macon Co.: Clokey 253 (Ca--882652); A. R. Moldenke 817 (Lw); Winterringer 6599 (Il--34140). Madison Co.: Demaree 27288 (N). Mason Co.: Ahles 2984 (Ur), 4110 (Ur); Ehringer 12410 (Il--18978); G. D. Fuller 2244 (Il--15811); F. C. Gates 3519 (Ur); G. N. Jones 22387 (Ur). Massac Co.: Winterringer 3554 (Il--28979). McDonough Co.: R. M. Myers M.83 (Il--23857). McHenry Co.: Nason s.n. [Algonquin, Aug. 4, 1878] (Ur), s.n. (Il--20860). Mercer Co.: Winterringer & Fuller 2868 (Il--27694). Morgan Co.: L. Carter 15255 (Il--32313); A. R. Moldenke 827 (Lw). Ogle Co.: A. E. Hills 3420-O (Il--15821). Peoria Co.: Heading s.n. [July 1875] (Ur); F. E. McDonald s.n. [Peoria, Jul. 1887] (Ur), s.n. [Peoria, July 1889] (Ur), s.n. [Peoria, July 1894] (Ca--104866), s.n. [Peoria, July 1903] (N). Piatt Co.: Ahles 3310 (Ur); G. N. Jones 20771 (Ur). Pike Co.: A. R. Moldenke 837 (Lw); H. N. Moldenke 21913 (Lw), 21914 (Lw). Pope Co.: Whiting 1757 (Il--15841). Pulaski Co.: Winterringer 5998 (Il--33174). Putnam Co.: R. G. Mills s.n. [July 4, 1941] (Ur). Randolph Co.: Winterringer 6769 (Il--34400). Richland Co.: R. Ridgway 1086 (Ur), 1155 (Ur), 1157 (Ur), 1158 (Ur), 3061 (Se--29293), 3167 (La); Scherer 536 (Il--26358, Ur). Rock Island Co.: E. T. Harper s.n. [Port Byron, August 1887] (Io--133293). Saint Clair Co.: Eggert s.n. [across river from St. Louis] (Go). Sangamon Co.: Ahles 4591 (Ur); G. D. Fuller 2341 (Il--15831), 4870 (Il--15836), 4907a (Il--15839), 5067 (Il--15860), 5087 (Il--15840), 5137 (Il--15835), 5167 (Il--15828), 5227 (Il--15837), 5257 (Il--15838), 5351 (Il--15829), 5565 (Il--15827), 6119 (Il--15826), s.n. [8/5/41] (Il--15825); A. R. Moldenke 822 (Lw). Scott Co.: A. R. Moldenke 830 (Lw). Stark Co.: V. H. Chase s.n. [July 10, 1895] (Ur). Tazewell Co.: V. H. Chase 3228 (Ca--882841, Ca--988091, Il--15817, N, Ur, Ur, Ur). Union Co.: G. D. Fuller 676 (Ur); Fuller & Fuller 228 (Il--15810), 676 (Il--15830). Vermilion Co.: G. N. Jones 12359 (Il--15822, N, Ur), 12957 (Ur), 14376 (Ur); Storm s.n. [July 28, 1949] (Ur, Ur). Wabash Co.: Schneck s.n. [July 30, 1879] (Ur), s.n. [Sept. 1, 1887] (Ur), s.n. [July 1888] (Ur); Shearer s.n. [Mt. Carmel, July 20, 1900] (Vi), s.n. [7/20] (Ur). Wayne Co.: M. Walker s.n. [Sept. 5, 1949] (Ur, Ur). Whiteside Co.: Ahles 4196 (Ur).

BOOK REVIEWS

Alma L. Moldenke

"Chemical Plant Taxonomy", edited by T. Swain, viii + 543 pp., illustr. Academic Press, London, England & New York, N. Y. 1963. 110 sh. or $16.00

This is a valuable adventuresome book that bridges the gap between yesterday and tomorrow in plant taxonomy, as well as the gap between organic chemistry and this phase of botany. It consists of sixteen pertinent papers that were presented at a symposium supported by the North Atlantic Treaty Organization in Paris in 1962, an explanatory preface, an appendix of the orders and families of the Spermatophyta arranged mainly according to Willis' adaptation of the Englerian system, and indices by authors, by plant genera and species, and by chemical compounds. The editor emphasizes that this is "not an attempt the classify plants solely on the basis of the chemical constituents.....The use of chemical criteria adds a powerful weapon to the armoury of the taxonomist. When properly applied it is undoubtedly more useful than much subjective morphology, although no more so than objective observation."

Modern chemical analytical techniques, serology, chromatography, ultra-violet and infra-red radiations, mass spectroscopy, and nuclear magnetic resonance can now provide the means of identifying in a short time a large number of individual secondary plant product compounds which can help sharpen distinctions in indeterminate taxa and disclose hitherto unsuspected relationships (providing they have the same metabolic pathways).

Certain chemical criteria have been employed in plant taxonomy for a long time, as in cases of flower colors, presence or absence or masking of green pigments, crystal formation, latex, aromatic oils, and waxes. Back in 1893 Monteverde demonstrated the presence of mannitol and dulcitol in 797 species of 191 genera of Scrophulariaceae. All of the authors mention that an enormous amount of exact chemical work must yet be done. Birch predicts that "the most illuminating information is likely to come from studies of the enzyme systems involved, not only their presence or absence, but the alterations in their substrate specificities and catalytic activities".

Correlated with plant classification systems are the findings of outstanding workers in reference to the distribution of the following groups of secondary plant products: (1) flavonoids which may be connected with the lignification process, (2) alkanes which include the plant waxes, (3) acetylenic compounds which are traced

especially through the Compositae, Umbelliferae, and the Araliaceae, (4) fatty acids in plant lipids such as the oils in many seeds which are listed by families, (5) aliphatic polyols and cyclitols with the former more common in cryptogams and the latter more common in dicots, and wherein "the occurrence of a hydroxyl group or a methoxyl group in this or that position is a sufficiently precise character to be of use in taxonomy", (6) plant glycosides of which there are analogous ones in monocots and in dicots, and in which some coumarin glycosides can be used to differentiate between sub-species, (7) anthocyanins with cyanidin in primitive plants and with pelargonidin and delphinidin in greater frequency in the more advanced plants with blue colors, and with nitrogenous pigments in the eight families of the Centrospermae, (8) alkaloids which have shown in the Rutaceae that the four principal subfamilies constitute a homogenous group that is less similar to adjacent families, (9) sulphur compounds which are widespread, present at the lowest oxidation step in biochemical key compounds, and especially abundant in the Cruciferae.

There are also excellent papers in which Gibbs deals with the history of this topic, Birch with biosynthesis pathways, and Erdtman with general aspects of chemotaxonomy.

There are a very few small items that should have been corrected before the book got to the market, such as the misspellings of Liriodendron tulipifera on p. 406 and of Wettstein on p. 416. The term Verbenaceae on p. 345 should have had its initial letter capitalized. And surely the plant family names should have been added to the index where genus and species names are listed, especially since one of the authors made an important point of always citing family names in the literature.

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"Principles of Numerical Taxonomy", by Robert R. Sokal & Peter H. A. Sneath, xvi + 359 pp., illustr. W. H. Freeman & Co., San Francisco, California & London, England. 1963. $8.50

At the beginning of this pioneer text there is a flow chart diagram of numerical taxonomy in practical application, illustrating the following steps:
(1) choice of specimens which is to be made from many individuals that are more or less central in their range of traits;
(2) discovery and measurement of characters which are to be phenetic and never intentionally phyletic because in so many cases the phylogenies remain unknown. Morphological, physiological, ecological, behavioral and distributional characters should be considered and all with equal value. At least 60 seem desirable, and not less than 40 should be used. The authors expect that a great majority of these phenetic groups will prove to be cladal since the similarities are usually due to close ancestry. This

concept does conflict with traditional taxonomy, but is in step with the Adansonian practice of equal weight for every character;
(3) coding of characters expressed as Operational Taxonomic Units of differing hierarchic levels;
(4) calculation of affinity or similarity between specimens with the use of computing machines for the efficient handling of much data and with the use of coefficients on the relative degrees of difference between the O T U compared;
(5) clustering of specimens into phenons which are groups established by numerical taxonomy without any evolutionary or nomenclatural connotations, and with a number prefaced to indicate the level of affinity derived by cluster analysis techniques. "Phenons" are not synonymous with "taxa", but they often approach natural "taxa" delimitations. The prime purpose of a taxonomic system should be economy of memory. The most powerful method of achieving it is the method of nested hierarchy. Using dividing lines at the places of greatest gaps after cluster analysis of the phenetic characters "natural" taxa are formed;
(6) extraction of data on taxa leading to keys constructed on the principle of the information theory and with the further use of computers;
(7) identification of specimens by use of the keys and 2 or 3 dimentional dendrograms.

To date this system has proven most valuable among the protists, especially the bacteria. Among the higher organisms it has been shown operational in Hoplitis, Aedes, Euphydras, Cliona, Solanum, Oryza, etc. The authors pay great tribute to the numerical approaches to plant classification of Adanson and to bee classification by Michener.

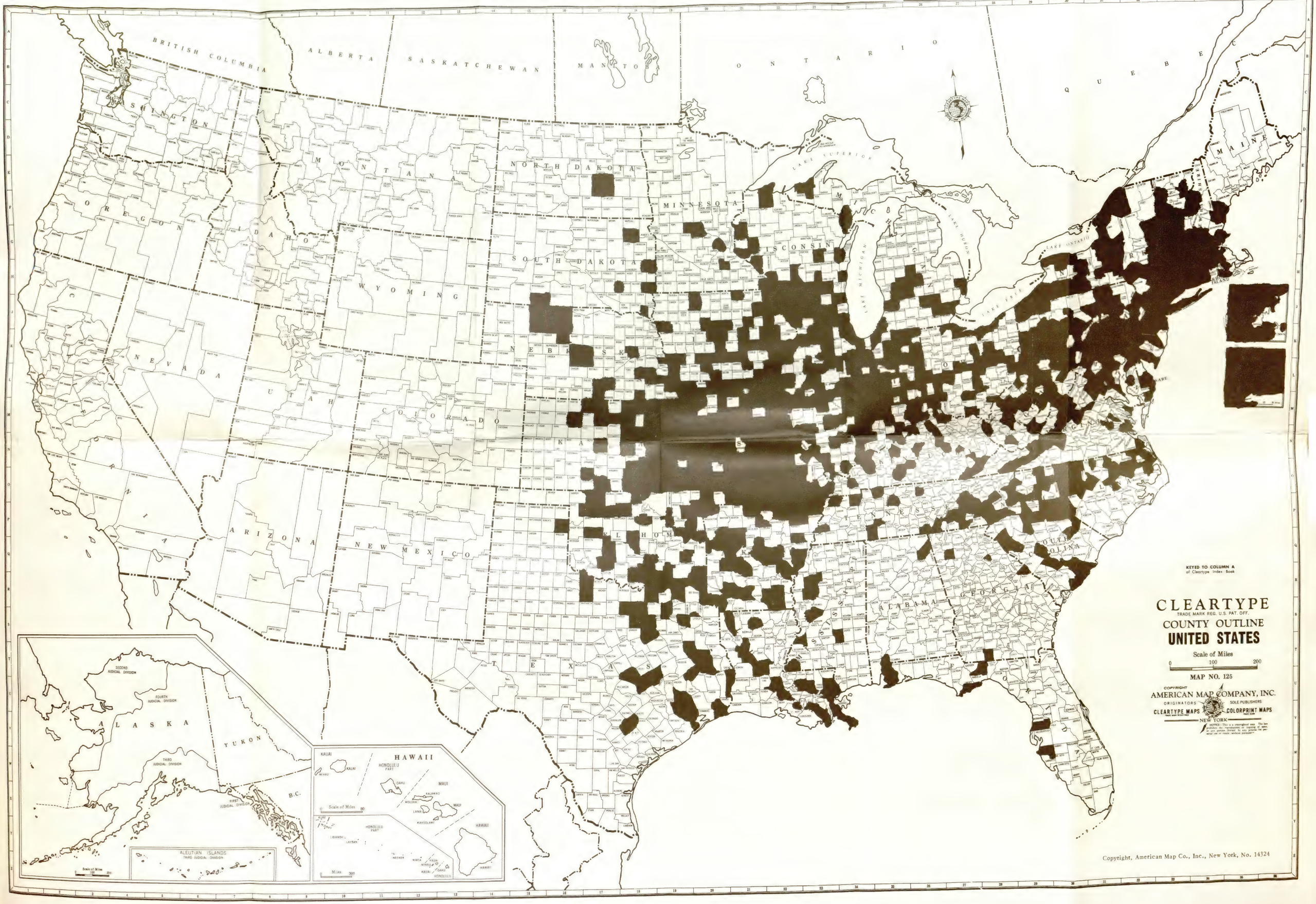
Since taxonomy is really data processing for biology, the approach well explained in this book can offer much, along with the other newer branches in this discipline, to improving by additions and corrections the long established and presently used system of taxonomy. It could thus be of greater service to the general advancement of science than it would as an entirely new discipline. It cannot offer perfection because it, too, is subject to error, omission and the poor choice of criteria.

Sokal & Sneath assure their readers that their choice of phenetic over phyletic characters does not make their philosophy anti-evolutionary because only the principles and processes of classification and not the entire field of systematics are so restricted.

Figure 19. Distribution of Verbena urticifolia in the United States

Herbarium curators who have material of this species from additional counties are asked to send it to the author for verification and record, so that future editions of this map may be more complete

Mapping by counties done by Andrew R. Moldenke



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THE GRASS GENUS DISSANTHELIUM

Jason R. Swallen and Oscar Tovar

The genus Dissanthelium was founded by C. B. Trinius in 1836 (Linnaea 10: 305. 1836) based on a single species, D. supinum, from Peru, "in frigidissimis ad Cerro de Pasco (America caliodore, Poeppig)." It is characterized by two awnless florets, mostly exceeded by the equal glumes.

The name Dissanthelium was derived from the Greek word discos, double, and anthelion, a small flower, alluding to the two small florets (Hitchcock, "Manual of the grasses of the United States," p. 173. 1935). The type species of the genus was first described by Presl as Brizopyrum calycinum and soon after was transferred to Poa by Kunth, apparently without having seen the plant.

A. S. Hitchcock examined the type of Presl's species (Brizopyrum calycinum) at the herbarium of the German University in Prague and found that it was the same as the type of Trinius' species (Dissanthelium supinum) which he examined in the herbarium of the Academy of Sciences at Leningrad. Fragments from the types are in the U. S. National Herbarium. On grounds of priority the older name must be adopted. The second Peruvian species was first given a name by Steudel without description and the plant was distributed by Hohenacker in his exsiccatae (Lechler, Plantae Peruvianae, No. 1836) as Vilfa macusaniensis Steud., which was collected "in pascuis prope macusani, Lechler 1836." Macusani is in the Puno in the southern part of Peru. Later Pilger described the same species as Dissanthelium minimum, basing it on Weberbauer No. 5451 from Peru.

Dissanthelium is a genus exclusively American occurring principally in the central Andes of South America at altitudes between 4000 and 4800 meters. The greatest concentration of species is in the Peruvian Andes. One species, D. californicum (Nutt.) Benth., is confined to islands off the southern coast of California, U.S.A.; D. sclerochloides Fourn. is found in Mexico and the central Andes; D. patagonicum Parodi is only known from the Patagonian region of Argentina; and the other 14

Dr. Oscar Tovar is from the University of San Marcos, Lima, Peru. He studied grasses at the U. S. National Museum from September 28, 1959, until December 1960 under a Fellowship from the John Simon Guggenheim Memorial Foundation. He prepared the manuscript of "Dissanthelium" at that time. I had been interested in the genus for some time previously and had designated several new species which are described herein. J.R.S.

species are from the central Andes of Peru and Bolivia. D. calycinum (Presl) Hitchc. and D. minimum Pilger are widely distributed dwarf species of the high Andes.

The peculiar geographical distribution of the species of Dissanthelium in the central Andes is of interest. They occur only in the "Puna" and are never found in the "Paramo" of Ecuador and Colombia. Neither are they found in the "Jalca" of northern Peru which has a high humidity in comparison with the Puna.

A. S. Hitchcock, in his "Dissanthelium, an American genus of Grasses" recognized only 3 species. The present paper includes 17 species, 10 of which are described as new. All the species considered have been examined in the U. S. National Herbarium (US), Smithsonian Institution. The types and isotypes are deposited there and without these it would have been impossible to solve certain problems satisfactorily.

Most species of Dissanthelium are dwarf; few of them are more than 10 cm. tall. They are mostly perennial with only three annual species. The culms are mostly tufted, erect, glabrous, sometimes decumbent at the base, and in a few cases rhizomatous.

The sheaths are mostly glabrous, only in D. patagonicum, D. longiligulatum, and D. densum are they minutely scabrous. The lower sheaths are shorter than the upper, and sometimes the uppermost is elongate reaching the base of the panicle. The ligule is always membranaceous, usually less than 2.5 mm. long, or rarely as long as 5 or 6 mm. in D. longiligulatum and D. rauhii. The blades are usually narrow, involute, in a few cases folded or flat, soft or subcoriaceous, mostly scabrous or scaberulous above, glabrous beneath, ascending or spreading, the apex acute, subacute, or obtuse.

The panicles are dense or somewhat open. The branches may be appressed, ascending or spreading, floriferous to the base or sometimes naked below for a short distance. The pedicels are scabrous or scaberulous, except in D. semitectum where they are minutely villous.

The small spikelets may be 2-3-flowered, but they are usually 2-flowered, the lower floret always a little longer than the upper. The glumes are equal or nearly so, 3-nerved, usually longer than the florets, only in a few cases as in D. patagonicum, D. aequale, D. brevifolium, and D. rauhii are they as long as the florets. They may be ovate, ovate-lanceolate, oblong-lanceolate or subacuminate, rarely somewhat arcuate, commonly glabrous or scaberulous on the keel toward the summit, the margins sometimes scarious.

The lemmas are usually scabrous or scaberulous, in a few

cases such as D. peruvianum, D. trollii, and D. pygmaeum they are glabrous, and only in D. patagonicum are they densely villous. They are ovate, ovate-lanceolate, or rarely more or less oblong-lanceolate, the apex mostly acute or subacute, sometimes obtuse or subobtuse, 3-nerved, the lateral nerves close to the margin.

The palea is a little shorter than the lemma, narrow, mostly membranaceous, sometimes more or less hyaline, usually minutely scabrous-ciliate on the keels toward the tip. Only in D. patagonicum is it somewhat villous on the keels. The rachilla joint between the florets is glabrous, commonly less than 0.5 mm. long. In the majority of the species, the anthers are less than 1 mm. long, but D. trollii and D. pygmaeum have anthers 2-2.2 mm. long.

The annual or perennial habit, the type of blades, the relative size of glumes and lemmas, the smooth or scabrous lemmas, and the size of the anthers are of especial importance in the taxonomy of Dissanthelium.

These studies have been made during the junior author's tenure as a Fellow of the John Simon Guggenheim Memorial Foundation. The work was done in the Department of Botany, United States National Museum, Smithsonian Institution. To the authorities there, I wish to express sincere thanks for the support and facilities offered. The author is greatly indebted to Dr. Jason R. Swallen for his guidance and criticism, at whose suggestion the project was undertaken, and to C. V. Morton for his generous help in other ways.

SYSTEMATIC TREATMENT

DISSANTHELIUM Trin. Linnaea 10: 305. 1836.
Phalaridium Nees, Nov. Act. Acad. Caes. Leop. Carol. 19: Suppl. 1: 29. 1841; 161. 1843.
Stenochloa Nutt. Journ. Acad. Phila. II. 1: 189. 1847.

Spikelets 2-3-flowered (mostly 2-flowered), the lower floret a little longer than the upper; rachilla disarticulating above the glumes and between the florets; glumes firm, equal or nearly so, ovate-lanceolate or subacuminate, usually longer than the florets or somewhat shorter, 3-nerved, the margins sometimes scarious; lemmas ovate, oblong or more or less elliptic, acute, subacute or obtuse, mostly scaberulous, rarely villous or glabrous, membranaceous or subcoriaceous, 3-nerved, the lateral nerves close to the margins; palea somewhat shorter than the lemma, mostly membranaceous, minutely scabrous-ciliate on the keels toward the tip; anthers usually less than 1 mm. long, rarely 2-2.2 mm. long. Annual or perennial tufted grasses, with narrow spikelike or small open panicles.

Type species: Dissanthelium suoinum Trinius.

KEY TO THE SPECIES

Annual.
Panicles more than 10 cm. long, not spikelike, somewhat loose, the branches ascending..... 1. D. californicum
Panicles less than 4 cm. long, dense, spikelike, the branches appressed.
Lemmas minutely pubescent or scabrous, ovate-oblong, toothed; glumes oblong-lanceolate; blades usually somewhat involute..... 2. D. minimum
Lemmas glabrous, ovate, entire, obtuse or rarely subacuminate; glumes ovate-lanceolate; blades always flat..... 3. D. peruvianum

Perennial.
Lemmas glabrous, even on the keel; anthers 2-2.2 mm. long.
Tip of blades acute; glumes soft, the nerves inconspicuous; lemmas obtuse..... 4. D. trollii
Tip of blades obtuse; glumes firm, the nerves prominent; lemmas acute or subacuminate... 5. D. pygmaeum
Lemmas scabrous, at least on the keel, minutely hispidulous or villous; anthers less than 1 mm. long.
Lemmas densely villous; palea somewhat villous on the keels..... 6. D. patagonicum
Lemmas scabrous or minutely hispidulous; palea sparsely scaberulous on the keels.
Lower lemma more than 3.8 mm. long; spikelets 5.7-6.5 mm. long.
Panicles lax, few-flowered, not spikelike; glumes as long as the florets or nearly so; blades involute, pubescent above.... 7. D. aequale
Panicles dense, spikelike; glumes 2-2.5 mm. longer than the florets; blades flat or folded, wide, scaberulous above..... 8. D. longiligulatum
Lower lemma less than 2.8 mm. long; spikelets 2.5-5.3 mm. long.
Glumes distinctly longer than the florets.
Glumes narrow, acuminate or subacuminate, somewhat arcuate.
Lemmas oblong-lanceolate, acute.
9. D. semitectum
Lemmas oblong, obtuse or subacute.
Lemmas 1.9-2.1 mm. long; blades involute, pointed at the apex.
10. D. laxifolium
Lemmas 2.5-2.7 mm. long; blades folded or flat, obtuse or rarely subacute at the apex..... 11. D. breve
Glumes ovate-lanceolate, not arcuate.
Blades smooth and shining beneath, the nerves not conspicuous.
Glumes 2.4-3 mm. long; lower lemma 1.8-2.1 mm. long, obtuse or subacute.
12. D. calycinum

Glumes 3.5-4.2 mm. long; lower lemma 2.4-2.8 mm. long, acute. 13. D. sclerochloides

Blades dull, not shining beneath, the nerves conspicuous.

Panicle dense, spikelike, the branches appressed, usually floriferous to the base; anthers 0.5-0.6 mm. long; lemmas minutely hispidulous. 14. D. densum

Panicle loose, not spikelike, the branches spreading or divergent, usually naked at the base for a short distance; anthers 0.9-1 mm. long; lemmas scaberulous.... 15. D. expansum

Glumes as long as the florets or nearly so, somewhat ovate-lanceolate.

Panicle less than 1.5 cm. long; blades coriaceous, rigid, spreading; lemmas obtuse, scabrous; upper ligule mostly 2 mm. long. 16. D. brevifolium

Panicle more than 3 cm. long; blades subcoriaceous, ascending; lemmas subacute, scarcely pubescent; uoper ligule mostly 4-5 mm. long..... 17. D. rauhii

1. DISSANTHELIUM CALIFORNICUM (Nutt.) Benth. in Hook. Icon. Pl. III. 4: 56, pl. 1375. 1881.
Stenochloa californica Nutt. Journ. Acad. Sci. Phila. II. 1: 189. 1848.

Annual; culms somewhat geniculate at the base, 20-35 cm. tall; lower sheaths shorter than the upper, the uppermost elongate; blades 8-13 cm. long, 2-4 mm. wide, flat; panicles 10-15 cm. long, rather loose, the branches in fascicles, ascending, slender, flexuous, some of them floriferous to the base; spikelets 2-3-flowered, the lower floret a little longer than the upper; glumes nearly equal, narrow, acute, glabrous or minutely scabrous on the keel toward the tip, 3-nerved; lower lemma 2.1-2.2 mm. long, more or less lanceolate, scarcely pubescent, 3-nerved; palea a little shorter than the lemma; rachilla joint 0.3 mm. long; anthers 0.4 mm. long.

Type: "Catalina Island, California, Gambel."

Distribution: Open ground, islands off the southern coast of California.

California: San Clemente Island, Trask 324.

2. DISSANTHELIUM MINIMUM Pilger, Bot. Jahrb. Engler 56: Beibl. 123: 28. 1920.
Vilfa macusaniensis Steud. ex Lechl. Berb. Amer. Austr. 56. 1857, name only. (Lechler 1836).
Graminastrum macusaniense Krause, Beih. Bot. Centralbl. 32: 348. 1914. Based on Vilfa macusaniensis Steud.

Annual; culms 3-7 cm. tall, slender, erect, more or less filiform, glabrous; sheaths glabrous, membranaceous at the base, the lower shorter than the upper; ligule membranaceous, 0.7-1.7 mm. long; blades 1-4 cm. long, somewhat involute or flat, subacute, smooth, ascending, glabrous, the uppermost reaching almost the apex of the panicle; panicles 1-2 cm. long, oblong, dense, the branches appressed, floriferous to the base; glumes equal, 3.3-4.2 mm. long, 0.5 mm. longer than the florets, ovate-lanceolate, glabrous or minutely scaberulous on the keel toward the summit, somewhat scarious toward the margins, 3-nerved; lower lemma 2.5-2.8 mm. long, ovate-oblong, trifid, the middle tooth longer than the others, membranaceous, hyaline toward the tip, minutely pubescent, 3-nerved, the lateral nerves close to the margin; palea a little shorter than the lemma, the narrow tip somewhat bifid, minutely ciliate on the keels; rachilla joint 0.3-0.4 mm. long; anthers 0.3 mm. long.

Type: "Mountains of Peru, between Pisco and Ayacucho, Weberbauer 5451."

Distribution: Open ground in the Andes of Peru and Bolivia, between 3900 and 4500 meters altitude.

Peru: Ancash: Prov. Bolognesi: between Llamac and Jahuacocha, Dist. Pacllón, Cerrate 2323; Conococha, Cerrate 442; Marcará, Velarde 3202. Pasco: Cerro de Pasco, Hitchcock 22240. Junín: between Tarma and Jauja, Killip & Smith 21951. Lima: Prov. Huarochiri: Chicla, between Lima and Oroya, Asplund 11477; Viso, between Lima and Casapalca, Macbride & Featherstone 628; around Tuctucocha lagoon, Cerrate 1856; Prov. Canta: near Antacocha, Cerro Colorado, east of Canta, Pennell 14654. Huancavelica: Prov. Castrovirreina: around Choclococha, between Huancavelica and Castrovirreina, Tovar 2836; Pucapampa, below Chonta Pass, between Huancavelica and Castrovirreina, Tovar 2961; Prov. Huancavelica: Huaytanayocc-Tansiri, Dist. Conaica, Tovar 2572; Laria, about 6 miles from Conaica, Tovar 2493. Puno: near Macusani, Lechler 1836. Salinas, Rauh & Hirsch P-608. La Raya, Rauh & Hirsch P-668.

Bolivia: La Paz: Copacabana, near Lake Titicaca, Asplund 13484; La Paz, Buchtien 6420. Oruro: Challapata, on railroad between Oruro and Uyuni, Asplund 9545. Larecaja: vicinity of Sorata, Ancouma, between Pongo and Anilaya, Mandon 1346.

3. DISSANTHELIUM PERUVIANUM (Nees & Mey.) Pilger, Bot. Jahrb. Engler 37: 378. 1906.

Phalaridium peruvianum Nees & Mey., Nov. Act. Acad. Caes. Leop. Carol. 19: Suppl. 1: 29. 1841; 161. 1843.

Annual; culms somewhat geniculate at the base, 2.5-13 cm. tall, glabrous; sheaths glabrous, membranaceous at the base, the uppermost elongate reaching the base of the panicle; ligule 1-4 mm. long, membranaceous; blades 1-4 cm. long, 1.5-3 mm. wide, flat, smooth, soft, glabrous on both surfaces, ascending, the uppermost reaching the apex of the panicle; panicles 1-3.5 cm. long, 0.4-0.8 cm. wide, rather dense, the branches appressed, floriferous to the base, the branchlets ascending; glumes equal,

2.8-3.5 mm. long, 0.8-1.3 mm. longer than the florets, ovate-lanceolate, glabrous or scaberulous on the keel toward the summit, scarious on the margins, 3-nerved; lower lemma 2.2-2.5 mm. long, ovate, obtuse or rarely subacute at the apex, glabrous, obscurely 3-nerved, the lateral nerves close to the margins; palea a little shorter than the lemma, the narrow tip truncate, glabrous; rachilla joint 0.3-0.4 mm. long; anthers 0.3 mm. long.

Type: "Lake Titicaca, Peru, Meyen."

Distribution: Confined to the central Andes of Peru and Bolivia, between 3700 and 4200 meters altitude.

Peru: Ancash: Prov. Bolognesi: vicinity of Lake Condorcocha, Cerrate 2257. Lima: Prov. Huarochiri: Chicla between Lima and Oroya, Ball in 1882 (Herb. Kew). Huancavelica: Prov. Tayacaja: Millpu, Puna of Hda. Tocas, between Colcabamba and Paucarbamba, Tovar 1950; Hacienda Alalay, between Mariscal Caceres and Pampas, Tovar 1350; Prov. Castrovirreina: vicinity of Laguna Choclococha, Tovar 2826; Prov. Huancavelica: Sachahuaccta, 6 Km. N.W. from Conaica, Tovar 940.

Bolivia: La Paz: Incachaca, Asplund 9549. Potosí: without locality, D'Orbigny 136, 186, 191; General Campero, on railroad between Viacha and Arica, near Corocoto, Asplund 13490.

4. DISSANTHELIUM TROLLII Pilger, Notizbl. Bot. Gart. Berlin, 11: 778. 1933.

Perennial, somewhat rhizomatous; culms glabrous, 3-5.5 cm. tall; sheaths membranaceous, glabrous, sometimes scaberulous, the lower shorter than the upper; ligule membranaceous, the tip toothed, 0.5-1 mm. long; blades 1.5-3 cm. long, 1-2 mm. wide, spreading, flat or sometimes nearly involute, acute, soft, scaberulous on both surfaces, scabrous on the margins; panicles 1.3-2 cm. long, 0.5 cm. wide, few-flowered, the branches appressed, floriferous to the base, the branchlets appressed; glumes equal, 4.5-5 mm. long, 1.5-1.8 mm. wide from keel to margin, as long as the florets or sometimes 0.3 mm. longer, ovate, obtuse or subacute, smooth, dull, rarely somewhat scaberulous toward the tip, scarious on the margins, 3-nerved; lower lemma 4-4.3 mm. long, 1.2 mm. wide from keel to margin, obtuse, glabrous, soft, 3-nerved; palea a little shorter than the lemma, the narrow tip subacute, glabrous, the nerves prominent; rachilla joint 0.3 mm. long, stout; anthers 2-2.2 mm. long.

Type: "Bolivia, San Edwardo bei La Union, C. Troll 1966."

Distribution: Known only at high altitudes (Puna) of Bolivia, between 4650 and 5000 meters altitude.

Bolivia: La Paz: Chacaltaya, 30 Km. from La Paz, Buchtien 1197. La Cumbre, railroad to Yungas, Parodi 10042; Cumbre, Tate 10.

5. DISSANTHELIUM PYGMAEUM Swallen & Tovar, sp. nov.

Perenne; culmi caespitosi, erecti, 2-3 cm. alti, glabri; vaginae glabrae, basin membranaceae; ligula 0.7-1 mm. longa,

membranacea; laminae 1-2 cm. longae, conduplicatae vel planae, obtusae, supra sparse pubescentes, subtus glabrae; paniculae 1-1.5 cm. longae, 0.5-0.6 cm. latae, vix pauciflorae, ramis appressis vel adscendentibus, glabris; glumae aequales, 4.5-5 mm. longae, quam flores 0.4 mm. longiores, glabrae, 3-nerves; lemma inferius 4-4.5 mm. longum, vix acuminatum, 3-nerve, glabrum; palea lemmate paulo brevior, glabra; rhachillae internodium 0.3 mm. longum; antherae 2 mm. longae.

Perennial; culms tufted, glabrous, 2-3 cm. tall; sheaths glabrous, membranaceous at the base, the uppermost elongate; ligule membranaceous, 0.7-1 mm. long, truncate or somewhat dentate; blades 1-2 cm. long, folded or somewhat flat, obtuse, scarcely pubescent above, glabrous beneath, spreading; panicles 1-1.5 cm. long, 0.5-0.6 cm. wide, rather few-flowered, the branches appressed or ascending, stiff, glabrous; pedicels glabrous; glumes equal, 4.5-5 mm. long, 1.2-1.4 mm. wide from keel to margin, 0.4 mm. longer than the florets, glabrous, shining, oblong-lanceolate, 3-nerved, the nerves prominent; lower lemma 4-4.5 mm. long, subacuminate, 3-nerved, glabrous; palea a little shorter than the lemma, the narrow tip more or less truncate, membranaceous, glabrous; rachilla joint 0.3 mm. long; anthers 2 mm. long.

Type in the U. S. National Herbarium, No. 2207161, collected in Huaytanayocc-Tansiri, near Manta, District of Conaica, Department and Province Huancavelica, Peru, altitude 4500 meters, May 11, 1956, by Oscar Tovar (No. 2545).

Distribution: Known only from the type locality.

6. DISSANTHELIUM PATAGONICUM Parodi, Physis 8: 80, fig. 7. 1925.

Perennial; culms tufted, erect, 12 cm. tall; sheaths scaberulous, the lower shorter than the upper, membranaceous at the base, the uppermost elongate, somewhat coriaceous; ligule 1.5-4 mm. long, membranaceous; blades 1-2 cm. long, ascending, rigid, pointed, involute or somewhat folded, glabrous or minutely scaberulous; panicles 5.5 cm. long, 0.6 cm. wide, narrow, few-flowered, the branches appressed or sometimes ascending, floriferous to the base, the branchlets appressed or somewhat ascending, stiff, scabrous; glumes equal, 4-4.5 mm. long, nearly as long as the florets or somewhat longer, linear-lanceolate or subacuminate, glabrous or scaberulous, coriaceous, 3-nerved; lower lemma 2.4-2.5 mm. long, ovate-lanceolate, obtuse or subacute, densely villous, 3-nerved; palea a little shorter than the lemma, the narrow tip bifid, villous on the keels; rachilla joint 0.8-1 mm. long.

Type: "Santa Cruz: Río Gallegos, leg. L. Dauber No. 180, verano 1922" (Argentina).

Distribution: Known only from the type locality.

7. DISSANTHELIUM AEQUALE Swallen & Tovar, sp. nov.

Perenne; culmi caespitosi, erecti, 13-16 cm. alti, minute scaberuli; vaginae glabrae vel scaberulae basin membranaceae; ligula 1-1.5 mm. longa, membranacea; laminae 6-10 cm. longae, involutae, supra pubescentes, subtus glabrae vel minute scabrae,

adscendentes vel appressae; paniculae 3.5-4.5 cm. longae, 0.7 cm. latae, pauciflorae, ramis appressis vel vix adscendentibus, ramulis appressis vel adscendentibus; glumae aequales, carina scabrae, 3-nerves; lemma inferius 5.5-5.8 mm. longum, scabrum, 3-nerve; palea lemmate paulo brevior, in carinis minute ciliata; rhachillae internodium 1 mm. longum.

Perennial, somewhat rhizomatous; culms tufted, erect, sparsely scabrous, 13-16 cm. tall; sheaths glabrous or minutely scabrous, membranaceous at the base; ligule membranaceous, 1-2.5 mm. long; blades 6-10 cm. long, involute, acute or subacute, pubescent above, glabrous or sparsely scabrous beneath, ascending or somewhat appressed; panicles 3.5-4.5 cm. long, 0.7 cm. wide, few-flowered, the branches appressed or ascending, angled, some of them naked below; glumes equal, 5.7-6.3 mm. long, nearly as long as the florets, linear-lanceolate, scaberulous on the keels toward the tip, 3-nerved, the lateral nerves conspicuous only at the base; lower lemma 5.5-5.8 mm. long, linear-lanceolate, scabrous, 3-nerved; palea a little shorter than the lemma, the tip bifid, minutely ciliate on the keels; rachilla joint 1 mm. long.

Type in the U. S. National Herbarium, No. 1818422, collected in Bolivia ("Plantae Andium Boliviensium") by G. Mandon (No. 1292A). This specimen was mixed with No. 1292.

Distribution: Known only from the type locality.

8. DISSANTHELIUM LONGILIGULATUM Swallen & Tovar, sp. nov.

Perenne; culmi erecti, basi decumbentes, 12-15 cm. alti, glabri; vaginae elongatae, scabridae, compressae, suprema basin paniculae aequans; ligula 2-6 mm. longa, membranacea, vix truncata; laminae 5-7 cm. longae, conduplicatae, rigidae, adscendentes, acutae vel submucronatae, supra scabridae, subtus glabrae, nervis prominentibus ad margin scabridis; paniculae 5 cm. longae, 1-1.3 cm. latae, densae, ramis appressis, et ramulis adscendentibus rigidis, scabris; glumae aequales, 6-6.5 mm. longae, floribus 2-2.5 mm. longiores, oblongo-lanceolatae vel subacuminatae, glabrae vel in carina scabrae, 3-nerves; lemma inferius 3.8-4 mm. longum, 0.8-1 mm. latum, subacutum, scabrum, 3-nerve; palea 2.6-2.8 mm. longa, membranacea, glabra, truncata; rhachillae internodium 0.4-0.5 mm. longum; antherae 0.6-0.7 mm. longae.

Perennial, rhizomatous; culms erect from a decumbent base, 12-15 cm. tall, glabrous; sheaths elongate, scaberulous, compressed, the lower shorter than the upper, the uppermost reaching the base of the panicle; ligule membranaceous, 2-6 mm. long, truncate; blades 5-7 cm. long, folded, somewhat rigid, ascending, acute or submucronate, sometimes nearly arcuate, scaberulous above, glabrous beneath, the nerves prominent, scabrous toward the margins; panicle 5 cm. long, 1-1.3 cm. wide, dense, spikelike, the branches somewhat appressed, some of them naked at the base for a short distance, the branchlets ascending, stiff, scabrous; glumes equal, 6-6.5 mm. long, 2-2.5 mm. longer than the florets, oblong-lanceolate or subacuminate, glabrous, sometimes scaberulous on the keels, 3-nerved; lower lemma 3.8-4

mm. long, 0.8-1 mm. wide from keel to margin, subacute, scaberulous, 3-nerved, the lateral nerves close to the margin; palea 2.6-2.8 mm. long, somewhat membranaceous, glabrous, the narrow tip truncate; rachilla joint 0.4-0.5 mm. long; anthers 0.6-0.7 mm. long.

Type in the U. S. National Herbarium, No. 1389108, collected in La Paz, Bolivia, altitude 18,000-20,000 feet, January 20, 1926, by A. Guerrero s.n.

Distribution: Known only from the type locality.

9. DISSANTHELIUM SEMITECTUM Swallen & Tovar, sp. nov.

Perenne; culmi caespitosi, basi decumbentes, 9-13 cm. alti, glabri; vaginae glabrae, suprema basin paniculae aequans; ligula 0.5-1 mm. longa, membranacea, subacuta; laminae 4-7 cm. longae, involutae, acutae, supra scabrae, subtus glabrae, adscendentes; paniculae 3.5-4.5 cm. longae, 0.8-1 cm. latae, ramis vix adscendentibus, basin floriferis, ramulis vix divergentibus; spiculae 2-3-florae (plerumque 2-florae), pedicellis villosis; glumae aequales, 4.6-5.3 mm. longae, floribus 1.8-2 mm. longiores, acuminatae, 3-nerves, glabrae vel minute scabrae; lemma inferius 2.5-2.7 mm. longum, subacutum, scabrum, 3-nerve; palea lemmate paulo brevior, truncata, in carinis minute scabra; rhachillae internodium 0.3-0.4 mm. longum; antherae 0.4-0.5 mm. longae.

Perennial; culms tufted, decumbent at the base, glabrous, 9-13 cm. tall; sheaths glabrous, the lower shorter than the upper, the uppermost reaching the base of the panicle; ligule membranaceous, subacute, 0.5-1 mm. long; blades 4-7 cm. long, the uppermost reaching the apex of the panicle, involute, acute, scabrous above, glabrous beneath, ascending; panicles 3.5-4.5 cm. long, 0.8-1 cm. wide, rather loose, the branches spreading or ascending, floriferous to the base or some of them naked below for a short distance; branchlets spreading; spikelets 2-3-flowered (usually 2-flowered), the pedicels villous; glumes equal, 4.6-5.3 mm. long, 0.8 mm. wide from keel to margin, 1.8-2 mm. longer than the florets, narrow, acuminate, rather arcuate, scarious toward the margins, 3-nerved, glabrous or minutely scabrous on the keels; lower lemma 2.5-2.7 mm. long, somewhat oblong-lanceolate, acute or subacute, scabrous, 3-nerved; palea a little shorter than the lemma, the narrow tip truncate, scaberulous on the keels, membranaceous; rachilla joint 0.3-0.4 mm. long; anthers 0.4-0.5 mm. long.

Type in the U. S. National Herbarium, No. 1161061, collected in clumps on northeastern rock ledge to Huaron, Department of Junín, Peru, altitude about 14,000 feet, June 12, 1922, by Macbride & Featherstone (No. 1155).

Distribution: Known only from the type locality.

10. DISSANTHELIUM LAXIFOLIUM Swallen & Tovar, sp. nov.

Perenne; culmi caespitosi, basi decumbentes, erecti, 8-13 cm. alti, glabri; vaginae glabrae, basin membranaceae, suprema basin paniculae aequans; ligula 2-2.5 mm. longa, membranacea; laminae 2.5-8 cm. longae, involutae vel planae, subacutae,

adscendentes, supra minute scabrae, subtus glabrae; paniculae 3-4.5 cm. longae, 1-1.7 cm. latae, ramis adscendentibus vel divergentibus, in parte inferiore nudis, ramulis adscendentibus; glumae aequales, 3.5-4 mm. longae, floribus 1.2-1.6 mm. longiores, vix subacuminatae, glabrae vel in carina scaberulae, 3-nerves; lemma inferius 1.9-2.1 mm. longum, obtusum vel subacutum, minute scabrum, 3-nerve; palea lemmate paulo brevior, in carinis minute ciliata; rhachillae internodium 0.3 mm. longum; antherae 0.4-0.5 mm. longae.

Perennial; culms tufted, somewhat decumbent at the base, erect, glabrous, 8-13 cm. tall; sheaths glabrous, membranaceous at the base, the uppermost elongate reaching the base of the panicle; ligule membranaceous, the uppermost 2-2.5 mm. long; blades 2.5-8 cm. long (the innovations filiform), soft, involute or rarely somewhat flat, pointed, ascending, minutely scabrous above, glabrous beneath, subacute or rather flexuous; panicles 3-4.5 cm. long, 1-1.7 cm. wide, loose, the branches ascending or spreading, some of them naked at the base for a short distance, the branchlets ascending; glumes equal, 3.5-4 mm. long, 1.2-1.6 mm. longer than the florets, linear-lanceolate, or sometimes subacuminate, arcuate, glabrous or scaberulous on the keel toward the summit, scarious on the margins, 3-nerved; lower lemma 1.9-2.1 mm. long, oblong, obtuse or subacute, minutely scabrous in the upper half, 3-nerved, the nerves close to the margin; palea a little shorter than the lemma, the narrow tip truncate, more or less hyaline, glabrous or minutely scabrous-ciliate on the keels; rachilla joint 0.3 mm. long; anthers 0.4-0.5 mm. long.

Type in the U. S. National Herbarium, No. 2207368, collected at Tinya, along Fortaleza valley, Province Bolognesi, Department Ancash, Peru, altitude 4000 meters, May 29, 1956, by Emma Cerrate (No. 2627).

Distribution: Peru at altitudes from 4000-4600 meters.

Peru: Junín: vicinity of Laguna Junín, Aguilar s.n. Huancavelica: Prov. Castrovirreina, near Lake Choclococha, Tovar 2833.

11. DISSANTHELIUM BREVE Swallen & Tovar, sp. nov.

Perenne; culmi caespitosi, erecti, 5-8 cm. alti, glabri; vaginae glabrae, membranaceae, suprema basin paniculae aequans; ligula 1-2.5 mm. longa, membranacea, vix truncata; laminae 1.5-3.5 cm. longae, adscendentes vel divergentes, conduplicatae vel planae, obtusae vel subacutae, supra scabrae, subtus glabrae; paniculae 2-3 cm. longae, 1-1.3 cm. latae, densae, ramis adscendentibus, in parte inferiore nudis, ramulis adscendentibus; glumae aequales, 4.5-5 mm. longae, floribus 2 mm. longiores, oblongo-lanceolatae, subacuminatae, glabrae vel in carina minute scabrae, 3-nerves; lemma inferius 2.5-2.7 mm. longum, obtusum, minute scabrum, 3-nerve; palea lemmate paulo brevior, truncata, in carinis minute ciliata; rhachillae internodium 0.3 mm. longum; antherae 0.5-0.6 mm. longae.

Perennial; culms tufted, erect, glabrous, 5-8 cm. tall; sheaths glabrous, membranaceous at the base, the uppermost

reaching the base of the panicle; ligule membranaceous, 1-2.5 mm. long, somewhat truncate; blades 1.5-3.5 cm. long, subcoriaceous, spreading or ascending, flat or folded, obtuse or subacute, scabrous above, glabrous beneath, dull, the nerves conspicuous; panicles 2-3 cm. long, 1-1.3 cm. wide, dense, the branches ascending, naked below for a short distance, the branchlets ascending; glumes equal, 4.5-5 mm. long, 2 mm. longer than the florets, oblong-lanceolate or subacuminate, sometimes arcuate toward the tip, glabrous or minutely scabrous on the keel, scarious on the margins, 3-nerved; lower lemma 2.5-2.7 mm. long, oblong, obtuse, scarious toward the tip and margins, minutely scabrous, 3-nerved; palea a little shorter than the lemma, the tip truncate or somewhat bifid, minutely ciliate on the keels; rachilla joint 0.3 mm. long; anthers 0.5-0.6 mm. long.

Type in the U. S. National Herbarium, No. 2181263, collected in Huaytanayocc-Tansiri, near Manta, District of Conaica, Department and Province Huancavelica, Peru, altitude 4400-4500 meters, March 31, 1953, by Oscar Tovar (No. 1161).

Distribution: High Andes of Peru and Bolivia.

Peru: Ancash: Prov. Bolognesi: Chonta Pass, Dist. of Ticllos, Cerrate 2661; Cordillera Blanca, Rauh & Hirsch P-2042. Huánuco: Prov. Dos de Mayo: Cordillera Raura, near glacier, Cardich s.n. Junín: Prov. Yauli: Anticona Pass, between Lima and Oroya, Ferreyra 10959; Ticlio, above Casapalca, Rauh & Hirsch P-252. Huancavelica: Prov. Tayacaja: Hacienda Huari, Salaverry 124; Prov. Castrovirreina: vicinity Laguna Choclococha, between Huancavelica and Castrovirreina, Tovar 2831, 2852, 2878, 2887; Prov. Huancavelica: Huaytanayocc-Tansiri, Dist. of Conaica, Tovar 2525. Cuzco: Ausangate, Rauh & Hirsch P-1183, P-1199.

Bolivia: La Paz: Chacaltaya, 30 Km. from La Paz, Buchtien 1194. La Cumbre, on railroad to Yungas, Parodi 10037. Prov. Larecaja, vicinity of Sorata, near Anilaya, Mandon 1345A.

12. DISSANTHELIUM CALYCINUM (Presl) Hitchc. Journ. Washington Acad. Sci. 13: 224. 1923.

Brizopyrum calycinum Presl, Rel. Haenk. 1: 281. 1830.
Poa calycina Kunth, Rev. Gram. 1: Suppl. XXVIII. 1830; Enum. Pl. 1: 326. 1833.
Dissanthelium supinum Trin. Linnaea 10: 305. 1836. (Cerro de Pasco, Peru, Poeppig).

Perennial; culms tufted, 2.5-8 cm. tall, glabrous; sheaths glabrous, membranaceous at the base, the lower shorter than the upper, the uppermost elongate; ligule membranaceous, 0.5-1 mm. long, acute: blades 1-3 cm. long, involute, ascending or spreading, scaberulous above, glabrous beneath, the uppermost almost reaching the apex of the panicle; panicles 1-2 cm. long, oblong or ovate, somewhat loose, the branches ascending, floriferous to the base, sometimes naked below for a short distance; glumes equal, 2.4-3 mm. long, 0.5 mm. longer than the florets, ovate-lanceolate or sometimes subacuminate, glabrous, 3-nerved, the

margins scarious; lower lemma 1.8-2.1 mm. long, ovate-oblong, obtuse or subacute, scaberulous on the upper half, subcoriaceous, 3-nerved, the lateral nerves close to the margin; palea a little shorter than the lemma, the narrow tip truncate, minutely ciliate on the keels, membranaceous; rachilla joint slender, 0.2-0.3 mm. long; anthers 0.5-0.7 mm. long.

Type: Original locality not known, but probably Peru where it is widely distributed, Haenke.

Distribution: High altitudes (Puna) of Peru and Bolivia between 4200 and 4900 meters altitude.

Peru: Lima: Prov. Huarochiri: Chicla between Lima and Oroya, Ferreyra & Hutchison 8253. Pasco: Cerro de Pasco, Hitchcock 22246; Casa Cancha, near Cerro de Pasco, Expl. Exped. Wilkes: in frigidissimis ad Cerro de Pasco, Poeppig. Junín: Prov. Junín: Hacienda Atocsaico, near Junín, Hitchcock 22207, 22214, 22203, 22204; Prov. Yauli: Ticlio Pass, Rauh & Hirsch P-90, P-306; Prov. Jauja: Hda. Cachi-cachi, Km. 35 between Jauja and Tarma, Velarde 2868. Huancavelica: Prov. Castrovirreina: near Laguna Choclococha, Tovar 2841; Prov. Huancavelica: Huaytanayocc-Tansiri, Dist. of Conaica, Tovar 1209, 2567. Ayacucho: between Huanta and Hacienda Pargora, Killip & Smith 23305. Puno: Prov. Carabaya: Hacienda Lacka, Macusani, Vargas 7891. Cuzco: Ausangate, Rauh & Hirsch P-1139.

Bolivia: La Paz, Rinconada, railroad between La Paz and Pongo, Hitchcock 22596 1/2. "Bolivian Plateau," Bang 1873.

13. DISSANTHELIUM SCLEROCHLOIDES Fourn. Mex. Pl. 2: 112. 1886. Deschampsia mathewsii Ball, Journ. Linn. Soc. Bot. 22: 60. 1885. (Casapalta, Peruvian Andes, Mathews).

Perennial; culms tufted, erect or somewhat geniculate at the base, glabrous, 5-9 cm. tall; sheaths glabrous, membranaceous at the base, the lower shorter than the upper, the uppermost elongate; ligule membranaceous, 0.5-1.3 mm. long; blades 1.5-4 cm. long, involute or sometimes somewhat folded, smooth, ascending, subacute, glabrous, the uppermost almost reaching the apex of the panicle; panicles 1.5-3 cm. long, 0.7-1 cm. wide, dense or rather lax, the branches ascending or appressed, floriferous to the base, the branchlets ascending; spikelets 2-flowered, rarely 3-flowered; glumes equal, 3.5-4.2 mm. long, 0.5-1 mm. longer than the florets, more or less ovate-lanceolate, acute, glabrous or scaberulous on the keel toward the summit, 3-nerved, the margins scarious; lower lemma 2.4-2.8 mm. long, ovate-lanceolate, scabrous, 3-nerved, the lateral nerves close to the margin; palea a little shorter than the lemma, truncate, minutely scabrous-ciliate on the keels toward the tip; rachilla joint 0.3 mm. long; anthers 0.6-0.7 mm. long.

Type: Fournier mentions two specimens, "Nevado de Toluca, Hahn, and San Luis de Potosí, Virlet 1434, Mexico."

Distribution: High altitudes of Mexico; central Andes of Peru and Bolivia.

Mexico: Mexico: Nevado de Toluca, Pringle 4222; Beaman 1692; Tlaloc, Beaman 2329; Ixtaccihuatl, Purpus 1633; Matuda

3800. Tlaxcala: Malinche, Beaman 2240.
Peru: Huancavelica: Prov. Huancavelica: Huaytanayocc-Tansiri, Dist. of Conaica, Tovar 2523.
Bolivia: Without locality, Mandon 1345.

14. DISSANTHELIUM DENSUM Swallen & Tovar, sp. nov.

Perenne; culmi caespitosi, erecti, 6-8 cm. alti, glabri; vaginae minute scabrae, basin membranaceae, suprema basin paniculae aequans; ligula 1-2 mm. longa, membranacea; laminae 2-5 cm. longae, adscendentes, acutae, conduplicatae vel planae, scabrae; paniculae 2-3 cm. longae, 0.7-1 cm. latae, densae, ramis rigidis, appressis, ad basin floriferis, ramulis adscendentibus vel appressis; glumae aequales, 3.5-3.7 mm. longae, floribus 0.6-0.7 mm. longiores vix lanceolatae, glabrae, 3-nerves; lemma inferius 2.5-2.6 mm. longum, obtusum, minute hispidum, 3-nerve; palea lemmate paulo brevior, in carinis minute ciliata; rhachillae internodium 0.3 mm. longum; antherae 0.5-0.6 mm. longae.

Perennial; culms tufted, erect, glabrous, 6-8 cm. tall; sheaths elongate, minutely scabrous, membranaceous at the base, the uppermost reaching the base of the panicle; ligule membranaceous, 1-2 mm. long; blades 2-5 cm. long, ascending, folded or sometimes flat, acute, minutely scabrous on both surfaces, the nerves conspicuous beneath; panicles 2-3 cm. long, dense, spike-like, the branches appressed, stiff, floriferous to the base, the branchlets ascending or nearly appressed; glumes equal, 3.5-3.7 mm. long, 0.6 mm. longer than the florets, somewhat lanceolate, glabrous, shining, scarious on the margins, 3-nerved; lower lemma 2.5-2.6 mm. long, somewhat oblong, obtuse, minutely hispidulous, 3-nerved, membranaceous toward the tip; palea a little shorter than the lemma, truncate, minutely ciliate on the keels toward the summit; rachilla joint 0.3 mm. long; anthers 0.5-0.6 mm. long.

Type in the U. S. National Herbarium, No. 2207162, collected between Huaytanayocc and Manta, District of Conaica, Department and Province Huancavelica, Peru, altitude 4500 meters, May 11, 1956, by Oscar Tovar (No. 2547).

Distribution: Known only from the type locality.

15. DISSANTHELIUM EXPANSUM Swallen & Tovar, sp. nov.

Perenne; culmi caespitosi, basi decumbentes, 6-10 cm. alti, glabri; vaginae minute scabrae, basin membranaceae; ligula 1-3 mm. longa, membranacea; laminae 1-4 cm. longae, conduplicatae vel planae, adscendentes, glabrae, obtusae vel subacutae; paniculae 2-3.3 cm. longae, 1.5-2 cm. latae, laxae, ramis divergentibus basi nudis, ramulis adscendentibus minute scabris; glumae aequales, 3.5-4 mm. longae, floribus 0.6 mm. longiores, oblongo-lanceolatae, glabrae vel in carina minute scabrae, 3-nerves; lemma inferius 2.4-3 mm. longum, oblongum, obtusum, minute scabrum, 3-nerve; palea lemmate paulo brevior, in carinis minute ciliata; rhachillae internodium 0.3 mm. longum; antherae 0.9-1 mm. longae.

Perennial; culms tufted, stout, somewhat decumbent at the

base, glabrous, 6-10 cm. tall; leaves mostly basal; sheaths short, minutely scabrous, membranaceous at the base, the uppermost elongate; ligule membranaceous, 1-3 mm. long; blades 1-4 cm. long, flat or folded, ascending, soft, glabrous on both surfaces, somewhat waxy, obtuse or subacute, scabrous on the margins; panicles 2-3.3 cm. long, 1.5-2 cm. wide, lax, the branches spreading, naked below for a short distance, the branchlets ascending, soarsely scabrous; glumes equal, 3.5-4 mm. long, about 0.6 mm. longer than the florets, oblong-lanceolate, glabrous or minutely scabrous on the keels, 3-nerved, purple toward the summit; lower lemma 2.4-3 mm. long, more or less oblong, obtuse, minutely scabrous, 3-nerved, the lateral nerves close to the margin; palea a little shorter than the lemma, nearly bifid at the tip, minutely ciliate on the keels toward the tip; rachilla joint 0.3 mm. long; anthers 0.9-1 mm. long.

Type in the U. S. National Herbarium, No. 604490, collected in Pinasniocc, Panticalla Pass, Peru, altitude about 3600 meters, June 18, 1915, by O. F. Cook & G. B. Gilbert (No. 1305).

Distribution: High Andes of Peru.

Peru: Pinasniocc, Panticalla Pass, Cook & Gilbert 1297. Huánuco: 15 miles N.E. of Huánuco, Macbride & Featherstone 2183. Lima: Ticlio, canyon of Río Rímac, Prov. Huarochiri, Hutchison 1215.

16. DISSANTHELIUM BREVIFOLIUM Swallen & Tovar, sp. nov.

Perenne; culmi caespitosi, 2-4 cm. alti, glabri; vaginae glabrae, suprema basin paniculae aequans; ligula 0.6-2 mm. longa, membranacea, truncata; laminae 0.6-1.5 cm. longae, conduplicatae vel vix planae, obtusae, supra scabrae, subtus glabrae; paniculae 0.8-1.5 cm. longae, 0.6-0.8 cm. latae, densae, ramis vix appressis vel adscendentibus, ramulis adscendentibus; glumae aequales, 3-3.4 mm. longae, flores aequantes, glabrae, 3-nerves; lemma inferius 2.2-2.5 mm. longum, scabrum, obtusum vel subacutum; palea lemmate paulo brevior, minute truncata, glabra, vel in carinis minute scabra; rhachillae internodium 0.4-0.5 mm. longum; antherae 0.6-0.8 mm. longae.

Dwarf perennial; culms stout, tufted, glabrous, 2-4 cm. tall, sheaths glabrous, the uppermost elongate, almost reaching the base of the panicle; ligule membranaceous, truncate or rather dentate, 0.6-2 mm. long; blades 0.6-1.5 cm. long, coriaceous, rigid, folded or sometimes flat, spreading, obtuse, scabrous above, glabrous, dull beneath; panicle 0.8-1.5 cm. long, 0.6-0.8 cm. wide, dense, the branches somewhat appressed or ascending, naked below, the branchlets ascending; glumes equal, subacute, 3-3.4 mm. long, more or less ovate, as long as the florets or nearly so, glabrous, rather scarious toward the margins, 3-nerved; lower lemma 2.2-2.5 mm. long, obtuse or subacute, scabrous, 3-nerved; palea a little shorter than the lemma, the narrow tip truncate, glabrous or minutely scaberulous on the keels, the nerves prominent; rachilla joint 0.4-0.5 mm. long; anthers 0.6-0.8 mm. long.

Type in the U. S. National Herbarium, No. 1161062, col-

lected on loose "doby" slope, at Yauli, Department Junín, Peru, altitude about 13,500 feet, May 25, 1922, by Macbride & Featherstone (No. 933).

Distribution: High Andes of Peru.

Peru: Junín: Huarón, northern part, Cerro de Pasco region, Macbride & Featherstone 1153. Pasco: Cerro de Pasco, Hitchcock 22228, 22233, 22242.

17. DISSANTHELIUM RAUHII Swallen & Tovar, sp. nov.

Perenne; culmi caespitosi, erecti, 6-9 cm. alti, glabri; vaginae glabrae, membranaceae, suprema basin paniculae aequans; ligula 4-5 mm. longa; laminae 1.5-3.5 cm. longae, adscendentes, conduplicatae vel planae, obtusae, supra minute scabrae, subtus glabrae; paniculae 3-4 cm. longae, 0.8-1.5 cm. latae, densae, ramis adscendentibus vel appressis, in parte inferiore nudis, ramulis adscendentibus; glumae aequales, 2.5-2.6 mm. longae, flores aequantes, ovate-lanceolatae, glabrae, 3-nerves; lemma inferius 2.1-2.2 mm. longum, vix oblongo-lanceolatum, subacutum, sparse pubescens, 3-nerve; palea lemmate paulo brevior, in carinis minute ciliata; rhachillae internodium 0.3 mm. longum; antherae 0.5-0.6 mm. longae.

Perennial; culms tufted, erect, glabrous, 6-9 cm. tall; sheaths glabrous, membranaceous at the base, the lower shorter than the upper, the uppermost sometimes readhing the base of the panicle; ligule membranaceous, the uppermost 4-5 mm. long; blades 1.5-3.5 cm. long, folded or somewhat flat, subcoriaceous, ascending, obtuse, minutely scabrous above, glabrous, dull beneath; panicle 3-4 cm. long, 0.8-1.5 cm. wide, rather dense, the branches ascending or nearly appressed, some of them naked at the base, the branchlets ascending; glumes equal, as long as the florets, 2.5-2.6 mm. long, ovate-lanceolate, glabrous, shining, 3-nerved; lower lemma 2.1-2.2 mm. long, more or less oblong-lanceolate, subacute, sparsely pubescent, 3-nerved, the nerves close to the margin; palea a little shorter than the lemma, more or less elliptic, truncate at the tip, minutely ciliate on the keels; rachilla joint 0.3 mm. long; anthers 0.6-0.8 mm. long.

Type in the U. S. National Herbarium, No. 2180752, collected in Salcantay, Peru, May 5, 1957, by Rauh & Hirsch (No. P-1418).

Distribution: Known only from the type locality.

CERTAMEN MELASTOMATACEIS IX.

2543 7

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Except for several problems in species groups for which types or type-notes are currently not available, consideration of the Depto. Amazonas Melastomataceae collected in 1962 has been completed; the field work was assisted by a grant from the National Science Foundation and the initial taxonomic remarks were published in Phytologia 9: 406-426. Dr. Ramón Ferreyra has continued the sampling of the Amazonas and related Cajamarca and Piura floras, partly assisted also by the National Science Foundation; comments on his and Acleto's collections of Melastomataceae have been included where appropriate. Drs. Sagástegui and López Miranda are continuing to furnish material of jalca-zone species from somewhat further south in Peru, mostly in La Libertad. Still lacking for definition of the southern limits of the jalca are adequate recent materials from the eastern cordillera in northern Libertad and northernmost Huánuco; together with the Cordillera Condor on the Ecuadorian frontier and the northern isolated part of the Cordillera Vilcabamba, these are the most promising of the botanically little-known high mountain zones in Peru and will well merit the attention of vigorous field men (but not the usual North American tyros) who can both manage exploration and return with well-prepared specimens.

Also included herewith are initial comments on the extensive Ecuadorian collections made in recent years by various Regnellidian expeditions; these critical materials have been made available for study by Dr. Ahlner and Dr. Afzelius of the Naturhistoriska Riksmuseum, Stockholm, through the intermediacy of Dr. Asplund. Where appropriate, notes on the collections of Asplund, Harling, Fagerlind & Wibom, and Lugo have been incorporated into the accounting of recent Ecuadorian materials collected by Camp, Maguire & Maguire, Cazalet & Pennington, and Dodson, to be published in the Memoirs of The New York Botanical Garden. Additional remarks on the extensive extraneous Regnellidian collections will continue in the future. To relieve my middle Andean preoccupation, the current notes have been leavened with some West Indian, Colombian, and Brazilian reflections.

Since my revision of the genus Brachyotum, the only significant accumulation of materials has been from northern Peru. Certainly the species density center for the genus is in Depto. Amazonas and indeed the problems had oriented long-range plans for field work toward this region since 1950. Peruvians living in Amazonas use the vernacular name "Sarcilleja" ("ear-pendants" in Quechua, referring to the pendulous flowers) for all species

of Brachyotum found there; the same vernacular name is also used for species of Fuchsia. A local remedy in Molinopampa for pneumonia is a petal infusion from any of several species, but especially from B. weberbaueri Cogn. Seeds of several species collected in 1962 were distributed by F. G. Meyer to various New and Old World botanical gardens. M. L. Solt has growing in Beltsville B. multinervium, B. radula, B. cogniauxii, and (from the Colombian Páramo de Chisaca) B. strigosum; of these, B. radula flowered in March, 1964, in about one year from seed. All of the numerous seedlings from each seed lot have been quite uniform morphologically.

The effective pollinators of Brachyotum species in Amazonas are hummingbirds and the genus must be the most important food source for these birds, of more significance there by sheer abundance than Fuchsia, Vacciniaceae, Labiatae, or Lobeliaceae. Dr. Alexander Wetmore (personal conversation) says that hummingbirds may prefer red flowers, but are not effectively color-specific in feeding. Grant (Evolution 3: 82-97. 1949) also noted that hummingbirds are not particularly species-constant. Thus the hybridity potential in Brachyotum is great in Amazonas. Actually the hybrid-origin individuals are percentage-wise quite rare. However, one of the Peruvian assistants during the 1962 field work, Segundo Sanchez Barrantes, had a discriminating eye for subtle morphologic variants; thus there rapidly accumulated a series of aberrant specimens which, herbarium-wise, would give disproportionate weight to the hybridity incidence. A micro-species taxonomist could easily proliferate binomials; for me practicality has induced discursive treatment without nomenclatural formality.

BRACHYOTUM QUINQUENERVE (R. & P.) Triana var. PUSILLUM Wurdack

The northern variety is quite common in the jalca zones above Laguna Pomacocha and near Molinopampa. Typically the corolla is a very deep bluish purple. A form with white petals margined pink was once seen near Molinopampa (Wurdack 1401), but showed no vegetative evidence of gene infiltration from other species.

BRACHYOTUM PARVIFOLIUM Cogn.

One of the commonest understory shrubs in the Molinopampa scrub forest (Wurdack 1354 p.p., 1619), B. parvifolium reaches its flowering peak in the latter part of May or early June. The robustness criterion originally cited (Mem. N.Y. Bot. Gard. 8: 367. 1953) for separation of B. barbeyanum is not valid, but the petal color and ovarial hair differences still seem applicable. One hybrid with the sympatric B. quinquenerve var. pusillum was collected in the Molinopampa jalca (Wurdack 1354 p.p.). Vegetatively this collection is somewhat closer to B. quinquenerve var. pusillum; reproductively, except for the 4-merous flowers and moderately short-strigose hypanthia, it resembles B. parvifolium (greenish-white corollas, large and adaxially strigose sepals). One of the abundant understory shrubs on the lower

eastern Calla-Calla slopes resembles a robust B. parvifolium, but with distinctly 5-nerved leaves and attenuated foliar pubescence, as well as glandular ovary hairs (Wurdack 1179); probably this population merits specific recognition (no possible parents for hybrid origin being noted in the Calla-Calla flora), but more observations are needed. The Calla-Calla shrubs probably flower abundantly in June, being mostly in young fruit on July 7.

BRACHYOTUM RADULA Triana

B. radula is common on Puma-urcu and Calla-Calla and quite constant there in 5-mery and pubescent petals; the closely related B. maximowiczii Cogn. is sympatric with B. radula, but generally at lower elevations with some altitudinal overlap. On the slopes of Cerro Malcabal is a small hybrid population with leaves yellow-tinged beneath (Wurdack 1434) or even reddish-tinged (Wurdack 1435). Vegetatively and in flower size, the Malcabal plants are like B. radula but with 4-merous flowers and nearly or quite glabrous petals as in B. maximowiczii. Atop Malcabal was a single plant (Wurdack 1436) like B. maximowiczii except for the somewhat pubescent petals; probably a slight infiltration of B. radula genes is represented in this collection.

BRACHYOTUM CORONATUM (Triana) Wurdack, comb. nov.

Pleroma coronatum Triana, Trans. Linn. Soc. Bot. 28: 41. 1871. Tibouchina coronata (Triana) Cogn., Mart. Fl. Bras. 14, 3: 307. 1885.

Brachyotum racemosum Cogn., Bot. Jahrb. 42: 132. 1908.

Examination of the holotype (Mathews 3211, K), in concert with recent Amazonas collections (Wurdack 676 and 1799), leaves no doubt as to the generic adjustment. The corolla is pale greenish yellow (not purple) and the calyx lobes are persistent. Mathews 3211 and the cited material of B. racemosum (Mem. N. Y. Bot. Gard. 8: 370. 1953) show somewhat longer upper leaf surface hairs than my current collections, but the variability does not seem significant. B. coronatum is an abundant shrub or small tree on both Puma-urcu and the eastern Calla-Calla slopes; probably it is the tallest species of the genus, commonly reaching 8 meters (although flowering when smaller), with one tree of 15 meters having been seen on the Calla-Calla slopes. From the description and type photograph (Macbride 16807), Tibouchina virescens Cogn. almost surely should be placed in Brachyotum, perhaps as conspecific with B. coronatum; the generic status cannot be settled, however, without actual examination of Junín collections.

BRACHYOTUM MULTINERVIUM Wurdack, sp. nov.

De speciebus 20-28 revisionis meae differt foliis 7-11-nervatis.

Trichomata laevia. Ramuli novelli obtuse quadrangulati demum teretes sicut petioli foliorum venae primariae subtus pedunculique sparse strigulosi pilis 0.4-0.8 mm longis crassis

arcte appressis. Petioli 2-4 mm; lamina (2-)3-4 X 1.5-3 cm, tenuiter coriacea ovata, apice late hebeti-acuto basi paulo (3-6 mm) cordata margine integro et appresso-ciliolato pilis ca. 1 mm longis et 1 mm inter se distantibus, 7-9(-11)-nervata nervis primariis supra impressis subtus elevatis nervis secundariis supra invisis subtus paulo obscuris et 3-4 mm inter se distantibus tertiariis non vel (subtus) obscure evolutis, supra et subtus nervis primariis marginibusque exceptis glabra. Inflorescentia terminalis vel in ramis lateralibus terminalis; flores 4-meri penduli terni vel in dichasiis tribus terni; pedunculus gracilis 2.5-3.5 cm longus ad apicem bracteis duabus 9-10 X 1-2 mm acutis caducis armatus; pedicelli penduli 10-15(-25) mm longi 2-5(-10) mm supra basim articulati et bibracteolati bracteolis 3-3.5 X 0.3-0.4 mm mox (in alabastris) caducis. Hypanthium (ad torum) 7-7.5 mm longum sicut pedicelli sepalaque extus sparse strigulosum pilis 0.2-0.6 mm longis et 2-5/mm². Calycis tubus 0.7-0.8 mm altus, lobis 7.5 X 2.5 mm lanceolatis acutis ciliolatis simu acuto. Petala 14.5-15 X 11.5-12.5 mm obovata apice obtuso ciliis sparsis 0.1-0.25 mm longis eglandulosis vel valde caduce glandulosis. Filamenta 3.5-4.1 mm glabra; antherarum thecae 4-5.8 mm, connectivo ad basim ventraliter 0.3-0.4 mm libero acute bilobulato. Stylus 22-23 X 0.5 mm glaber per 5-8 mm exsertus; ovarium apicem versus densiuscule strigulosum pilis robustis eglandulosis 0.2-0.6 mm longis, lobis apicalibus 0.6-0.9 mm longis.

Type Collection: J. J. Wurdack 1304 (holotype US 2404282; isotype USM; 13 additional isotypes to be distributed), collected in a slope seepage below Km 415 of the Balsas-Leimebamba road, middle eastern Calla-Calla slopes, Prov. Chachapoyas, Depto. Amazonas, Peru, elev. 3100-3250 m, 11 July 1962. "Shrub 0.4-1.5 m, locally frequent. Hypanthium yellow-red; corolla black-purple."

The foliar characters in B. multinervium are unique in the genus; the young leaves are often red-tinged beneath. In inflorescence features, perhaps B. sanguinolentum (Naud.) Tr. and B. alpinum Cogn. are the closest relatives. Wurdack 1263, from a single plant growing at the scrub forest edge near B. multinervium (but not in a seepage), represents a hybrid, with B. multinervium as one parent (multinerved leaves; pendulous flowers in dichasia, but with short peduncles). The other parent was perhaps B. naudinii (leaves petiolate, strigulose above; moderately strigulose hypanthia). The possible negation of the latter parent is the predominance of 5-merous flowers (12, 5-merous; 8, 4-merous), but the only possible parent with 5-merous flowers and smooth hairs seen in the Calla-Calla region, B. aff. parvifolium Cogn., does not seem as likely as B. naudinii.

BRACHYOTUM NAUDINII Triana

The northern population of this species (Mem. N. Y. Bot. Gard. 8: 383-384. 1953) is quite common in Amazonas, both on the eastern slopes of Calla-Calla (Wurdack 1172, Ferreyra & Acleto 15268, 15275) and on Puma-urcu (Wurdack 1141); the salient

features are 4-merous flowers, deep purple petals, and pubescence development suggestive of B. tyrianthimum Macbr. but with smooth hairs. One rare hybrid from Calla-Calla (but with B. naudinii genes predominating) is represented by Wurdack 1172, the leaves being larger than in the typical population, the petals pink, and, especially, the sepals inside strigulose; the only pale-petaled species in the immediate vicinity, B. aff. parvifolium (vide supra) also has adaxially strigulose sepals. Another hybrid, but also with B. naudinii genes slightly predominating, was sampled in Wurdack 1350; the roughened hairs, tendency to terminal flower triads, slight predominance of 5-mery, and sparsely strigulose petals suggest B. radula as the other parent. Still another hybrid (Wurdack 1349) is almost exactly intermediate toward B. cogniauxii Wurdack, with slightly roughened hairs, arcuate-strigose branchlets, partial development of floral bracts, and adaxially strigulose calyx lobes. A fourth hybrid (Wurdack 1133) intermediate in foliage, pubescence roughening, and corolla color toward B. angustifolium Wurdack (with the calcarate anthers of B. naudinii and the pendulous dichasia of B. angustifolium) occurs on Puma-urcu along with populations of its parent species; of the examinable flowers, 6 were 5-merous and 12, 4-merous. Certainly the rarity of these hybrids is conditioned by the temporal isolation, B. naudinii flowering somewhat later than the other parents in the various putative hybrids, although sympatric with them at 2750-2850 m elevation; also it is not found at higher elevations (2900-3300 m) on the Calla-Calla slopes, where B. radula and B. cogniauxii are still abundant. B. tyrianthinum Macbr., found as near Calla-Calla as Celendín (Cajamarca), is quite suggestive in superficial aspect of some of the B. naudinii hybrids.

BRACHYOTUM LONGISEPALUM Wurdack, sp. nov.

B. strigoso (L. f.) Tr. affinis, sed foliis supra tuberculato-strigulosis, calycis lobis lanceolato-oblongis non imbricatis.

Trichomata laevia. Ramuli teretes sicut petioli pedicellique dense strigulosi. Petioli 2-4 mm; lamina 7-15 X 2.5-4 mm rigida oblonga vel lanceolato-oblonga apice rotundato basi late acuta marginibus valde recurvatis, trinervata nervis lateralibus supra non visis, supra in lineis 6-8(-10) dense tuberculato-strigulosa, subtus dense strigulosa. Flores 5-meri nutantes in ramulis lateralibus singuli vel in dichasiis 3-floris; pedicelli 5-7 mm longi, bracteolis duabus plus minusve persistentibus 7-13 X 1-2 mm intus glabris extus modice strigulosis, 2-5 mm infra hypanthii basim insertis. Hypanthium (ad torum) 7-9 X 6 mm; calycis tubus 0.8-1 mm altus, lobis 11-13 X 3.5-4.5 mm extus sicut hypanthio dense strigulosis vel centraliter brevistrigosis intus glabris vel ad apicem ipsem sparse strigulosis. Petala ut videtur nigro-purpurea 17.5-18 X 14-15 mm elliptica apice rotundato et vix retuso ciliis glanduliferis glandulis mox caducis. Stamina (vix immatura)

glabra, antheris 3.5-3.7 mm apicaliter minute porosis, connectivo ventraliter ad basim biappendiculato, appendicibus ab thecis 0.9-1 mm liberis. Stylus 27 X 0.5-0.6 mm glaber; stigma punctiforme; ovarium ad apicem dense strigulosum pilis p. p. glanduliferis.

Type Collection: A. López Miranda & A. Sagástegui 3338 (holotype US 2338770; isotype TRP), collected in the jalca on the Travesía Laplap between Longotea and Bolívar, Prov. Bolívar, Depto. La Libertad, Peru, elev. 3600 m, 2 June 1960. "Arbusto. Flores vinosas."

Paratype: A. López & A. Sagástegui 3511 (NY, TRP), from the Pampa de Huayno-huincho, Huaylillas, Prov. Pataz, Depto. La Libertad, Peru, elev. 3350 m, 23 May 1961.

B. strigosum has much finer upper leaf surface pubescence, wider and imbricate calyx lobes, and non-glandular ovary pubescence. Perhaps a closer relative in floral form (but with much larger 5-nerved leaves) is B. benthamianum Tr., although the floral bracteoles in the Peruvian species never assume the bracteal proportions found in the Ecuadorian congener.

BRACHYOTUM MULTITUBERCULATUM Wurdack

The species is abundant along the Molinopampa-Diosan trail on the south side of the height-of-land (Wurdack 1606); it also occurs sporadically on the other hills near Molinopampa. One apparent hybrid with B. barbeyanum (Wurdack 1667) was found on Cerro Yama-Uma; it is rather closer to B. barbeyanum and does not have flaring-pored anthers. The smooth hairs in 1667 preclude consideration of any of the abundant rough-haired species near Molinopampa. The other wide-pored species of Amazonas, B. lycopodioides Triana, was abundant in the cumbre of Cerro Malcabal, where no other congener occurred; the petals of this vegetatively bizarre shrub are lavender (Wurdack 1411), a color not duplicated in other Amazonas species.

BRACHYOTUM ROSTRATUM (Naud.) Triana

B. rostratum is a frequently occurring species on the Calla-Calla crest (Wurdack 1190). On the approaches to Cerro Campanario was seen a hybrid (Wurdack 1590) having the general vegetative features of B. rostratum (and pink petals), but sepals longer than usual and adaxially strigulose, as well as calcarate anthers; perhaps the other parent was B. cogniauxii Wurdack. On the upper slopes of Puma-urcu, there is a variable population characterized by leaf blades more-or-less intermediate between B. rostratum and B. angustifolium (vide infra), nearly smooth trichomes, and notably glandular-setose hypanthia. Although the suggested parent species were not collected on Puma-urcu, I still believe in the hybrid origin of Wurdack 1697 and 786, the former vegetatively more like B. angustifolium and the latter like B. rostratum. The Puma-urcu shrubs resemble B. seorsum Wurdack in the combination of strigulose peduncles and glandular-setulose pedicels, but do not show the marked leaf veinlet reticulation (lower surface) of the Ecuadorian population. Dr. Ferreyra has collected near

Celendín (15042, 15126) another aspect of this complex, with moderately roughened trichomes, leaves as in typical B. rostratum, and inflorescences as in B. seorsum; accordingly, B. seorsum cannot be maintained as specifically separable from B. rostratum.

BRACHYOTUM ANGUSTIFOLIUM Wurdack

The type locality is the Chachapoyas region; the species is abundant on the Calla-Calla crest (Wurdack 1697, Ferreyra & Acleto 15330). On Puma-urcu above Chachapoyas, there apparently has been hybridization with both B. maximowiczii and B. radula; the leaf blades and inflorescences in the hybrids are intermediate, the petals pink (Wurdack 674).

MERIANIA MEXIAE Wurdack, sp. nov.

M. hexamerae Sprague affinis, sed foliis ovato-lanceolatis fere sessilibus basi cordata floribus minoribus.

Ramuli teretes graciles sicut folia inflorescentia floresque glabri. Folia in quoque jugo aequalia vel plerumque inaequalia (usque ad 1:2.5); petioli 0.3-0.7 cm; lamina (5-)9-16(-20) X (2.5-)4-7(-8) cm tenuiter rigida integra ovato-lanceolata apice hebeti-acuto, basi 0.4-1.1 cm cordata, 5-nervata nervis secundariis 3-5 mm inter se distantibus nervulis supra obscure vel paulo elevatis subtus paulo elevato-reticulatis, subtus sparse brunneo- vel nigro-punctata. Panicula 22-27 cm longa laxe multiflora; flores 6(-7)-meri, pedicellis 1-2.5 cm longis plerumque paulo supra medium articulatis, bracteolis delapsis non visis. Hypanthium (ad torum) 3-4.5 X 3.5-4 mm; calyx 2-2.5 mm altus integer, dentibus exterioribus non evolutis. Petala 16-25 X 11-16 mm glabra non ciliata oblongo-obovata apice asymmetrice rotundata. Stamina isomorphica glabra; filamenta 8-10 mm longa; antherarum thecae 7.5-10 mm subulatae ad apicem dorsaliter minute uniporosae, connectivo in calcar acutum dorsali 2-3 mm longum infra filamenti insertionem protracto dorsaliter per 3.4-4.3 mm ad basim vix elevato, appendice dorsali ascendente non evoluta. Stylus 14-16 X 1-0.6 mm glaber; ovarium 6(-7)-loculare glabrum apice vix (0.3 mm) concavo.

Type Collection: Ynes Mexia 6826 (holotype US 1663013; isotype NY), collected along river bank in dense forest between Baños and Mera, Prov. Napo-Pastaza, Ecuador, elev. 400-500 m, 23 Feb. 1935. "Shrub 2.5 m, infrequent. Flowers dark cerise."

Paratypes (all Ecuador): Dodson & Thien 2020 (US, MO), in rainforest at Topo on the road from Baños to Puyo, Napo-Pastaza, elev. 1300 m, 9 Jan 1962. "Vine; sepals very dark purple; petals purplish red; filaments purple; anthers yellow."; Pearce 421(K), from "east of the Andes, 5000-6000 ft."; Penland & Summers 155 (NY), from Río Margarjitas, Tungurahua, 1225 m, 19 Mar. 1939; Fagerlind & Wibom 2428(S), from Río Negro, Prov. Tungurahua; Asplund 19379 (S), from Río Zuñag, Prov. Napo-Pastaza, elev. 1150 m, 14 Feb. 1956.

Of 17 observable flowers, 15 were 6-merous and 2 were 7-merous. M. hexamera has well-petioled basally tapering leaves,

as well as hypanthium plus calyx 10-12 mm long. In Cogniaux' monograph, M. mexiae would key to M. rigida (Benth.) Tr., with smaller leaf blades that are distinctly petioled and apically rounded, 5-merous flowers, and evident (albeit very short) thick blunt external calyx teeth. Mexia 6826 was distributed as Axinaea sessilifolia Tr., which however has quadri-alate branches, plinerved leaf blades, and an obvious dorsal bulb on the stamen connective; unfortunately Rimbach 211 (NY, US), the type collection of Meriania simsiana Gleason, actually represents A. sessilifolia. For both Meriania rigida and Axinaea sessilifolia, type collections have been examined.

M. hexamera is sympatric in Napo-Pastaza with M. mexiae: Asplund 19378 (S), Cashurco-Río Zuñag, elev. 1200 m; Lugo 55 (S), Mera. An apparent hybrid between the two species, with cordulate leaf bases, well-defined upper leaf surface veinlet reticulation, and hypanthium plus calyx 8-10 mm long, is represented by Penland & Summers 241 (NY), from along the Río Pastaza between Hda. Victoria and the Río Topo, Tungurahua, elev. 1230 m, 23 Mar. 1939; the M. hexamera genes seem slightly predominant.

LEANDRA PELTATA Wurdack, sp. nov.

De affinitate mihi incognita, sed ob folia peltata bene distincta.

Ramuli teretes primum sicut petioli foliaque subtus modice setosi, pilis 1-2 mm longis plerumque non glanduliferis demum glabri. Folia per paria in dimensionibus plerumque satis (1: 2) disparilia sed in forma isomorphica; petioli 1.5-7 cm longi; lamina 5-15 X 2-5 cm membranacea oblongo-lanceolata apice gradatim per 1-2 cm hebeti-acuminato basi rotundata et distincte (3-7 mm) peltata margine integro et subappresse ciliato, 5-nervata, nervis tertiariis obscure evolutis laxe reticulatis. Inflorescentia terminalis 3-5 cm longa sparse glanduloso-setosa axe refracto ramis lateralibus 0.7-1.3 cm longis rectis 1-3(-5)-floris; flores 5-meri, pedicellis 1-5 mm longis glabris ca. 0.5 mm infra hypanthii basim bibracteolatis, bracteolis 0.4-0.7 mm longis subulatis. Hypanthium (ad torum) 1.4 mm longum modice setulosum setulis 0.5-1 mm longis plerumque glanduliferis; calycis tubus 0.2 mm altus, lobis interioribus 0.5-0.6 mm altis ovato-oblongis apice rotundato et pilis 2-3 glanduliferis 0.3-0.5 mm longis terminato, dentibus exterioribus ca. 0.3 mm longis tuberculatis non eminentibus apice setulifero. Petala glabra 3.1 X 1.4 mm asymmetrice ovata apice hebeti-acuto. Stamina isomorphica glabra; filamenta 1-1.2 mm; antherarum thecae 1.6 mm longae oblongae apice dorsaliter uniporoso, connectivo ad basim dorsaliter dente hebeti bilobulato 0.15 mm longo ornato. Stylus 4.1 X 0.4-0.25 mm glaber; stigma paulo expansum 0.45 mm diam; ovarium 5-loculare 1/4-inferum glabrum apice in collum 0.4 mm altum et 0.1 mm 5-lobulatum protracto; bacca globosa non costata; semina paulo immatura cuneata laevia 0.6 X 0.2 mm.

Type Collection: J. J. Wurdack 2474 (holotype US 2404488; isotype USM; 2 additional isotypes to be distributed), collected

on a forested ridge on right bank of Río Santiago 3-4 km above mouth, Prov. Bagua, Depto. Amazonas, Peru, elev. 300-350 m, 29 Oct. 1962. "Shrub 2 m. Corolla white."

While L. peltata has somewhat the aspect of the 4-5-merous species of Clidemia with diffuse inflorescences and tiny flowers (C. dimorphica Macbr. and allies, C. diffusa Donn. Sm., C. semijuga (Gleas.)Wurdack) and indeed some of these species show near approaches to peltate leaves, the floral details cannot be reconciled sufficiently for placement in Clidemia. Nor can this Santiago novelty be accomodated near any species of Ossaea. Admittedly the petals are bluntly acute, but are less rounded than those of the Mexican L. cornoides (S. & C.) Cogn. In Cogniaux' monographic arrangement, L. peltata should probably be aligned in Sect. Chaetodon where at least L. cornoides, L. laevigata (Tr.) Cogn., and L. refracta Cogn. also have 5-celled ovaries.

MICONIA CRASSIPES Triana

Obviously the Peruvian type locality, not known to Cogniaux or Macbride, is the Chachapoyas region, where this species is common in sheltered areas. Recent collections in Depto. Amazonas, all from 2200-2500 m elevation, are from Quebrada Molina below Chachapoyas (Wurdack 617), near Leimebamba (Ferreyra 15548, 15593), and the Laguna Pomacocha basin (Ferreyra & Acleto 15174, Wurdack 827).

MICONIA ALBORUFESCENS Naud.

M. arirambae Huber, Bull. Soc. Bot. Gen. ser. 2, 6: 192. 1915.

M. cachimbensis Brade, Arq. Jard. Bot. Rio 16: 14. 1959.

Excellent flowering material from the Rio Doce, Minas Gerais, Brazil (Pabst 7113, US) has enabled the completion of the synonymy previously suggested (Mem. N. Y. Bot. Gard. 10, no. 5: 172. 1964). The species thus is of wide distribution in savannas from Brazil to Venezuela. While there is a superficial resemblance to M. albicans (Sw.) Tr. (and indeed Blanchet 3309 was cited by Cogniaux as a mixture of the two species), M. alborufescens can be distinguished by the agglomerated non-secund flowers and the discrete (stellulate) tomentum on the young stems and inflorescences. Through Dr. L. B. Smith and Dr. Pabst, it has been possible to borrow for examination the holotype (Pereira 1779) and paratype (Pereira 1795) of M. cachimbensis (RB); the Cachimbo plants conform exactly to material from other parts of the range of M. alborufescens.

MICONIA ERNSTII Wurdack, sp. nov.

Sect. Glossocentrum. M. tetragonae Cogn. et M. perturbatae Wurdack in antherarum forma affinis, sed foliis ad basim paulo cordatis subsessilibus floribus sessilibus in inflorescentiae ramis secundis.

Ramuli primum paulo sulcati mox teretes sicut petioli foliorum venae primariae subtus inflorescentiae hypanthiaque

primum lepidibus ferrugineis minutissimis sparse obsiti mox glabrati. Petioli 0.3-0.6 cm; lamina tenuiter coriacea integra supra nitidula 6-14 X 3-5 cm oblongo-elliptica apice subabrupte per 0.5-1.5 cm acuminato basi 0.2-0.5 cm cordata, 3- vel obscure 5-nervata nervis secundariis 0.5-1 cm inter se distantibus tertiariis non vel obscure evolutis, supra et subtus in superficie venulisque glabra in venis primariis mox glabrata. Panicula 7-10 X 3-5 cm oblonga, ramulis paulo adscendentibus secundifloris; flores 5-meri sessiles, bracteolis 0.2-0.3 X 0.2 mm triangularibus in alabastris valde caducis. Hypanthium (ad torum) 2.2 X 1.5 mm obscure 10-costatum demum glabratum; calycis tubus 0.3 mm altus, lobis interioribus 0.2 mm altis ad apicem obtusis ad basim remotis, dentibus exterioribus minutissimis obscure elevatis non eminentibus. Petala glabra 2-2.2 X 1.6 mm elliptico-oblonga apice paulo emarginato. Stamina paulo dimorphica glabra, filamentis 1.8-1.9 mm longis, antheris ventraliter minute (0.2 mm) uniporosis. Stamina maiora: antherarum thecae 1 X 0.55 X 0.6 mm, connectivo usque ad filamenti insertionem 0.8 mm prolongato dorsaliter sub insertionem dente hebeti 0.5 mm longo armato. Stamina minora: antherarum thecae 0.7 X 0.5 X 0.6 mm, connectivo usque ad filamenti insertionem 0.9 mm prolongato sub insertionem dorsaliter dente hebeti 0.2 mm longo armato. Stylus 3.3 X 0.4 mm glaber; stigma truncatum 0.3 mm diam.; ovarium 3(?)-loculare 2/3 inferum apice late conico 0.3 mm alto sparse minutissimeque puberulo; fructus immaturus paulo 10-costatus.

Type Collection: W. R. Ernst 1723 (holotype US 2436501; 9 isotypes to be distributed), collected on the south slope of Morne Macaque (Micotrin) on the road to Fresh Water Lake, Dominica, British West Indies, elev. ca. 760 m, 26 June 1964. "Shrub about 3 m tall. Flowers white to pale pink. Only a single plant observed."

Paratype: W. H. Hodge 513 (US), from the upper rainforest-clad slopes, Morne Anglais, Dominica, elev. 763-1142 m.

Both the suggested relatives have well-petioled non-cordate leaves, as well as pedicellate and smaller non-secund flowers. In Cogniaux' monograph, M. ernstii would key to near M. ligustroides (DC.) Naud.; that Brazilian species, especially as to var. cordifolia Cogn., vegetatively is reminiscent of the Dominica congener, but shows pedicellate flowers with linear anthers. None of the West Indian species of Sect. Glossocentrum more recently described by Urban (M. bisulcata Urb., M. leptantha Urb., and M. ossaeifolia Urb. & Ekm.) seem to be at all closely related to M. ernstii. M. trichotoma (Desr.) DC., also known from Dominica, differs in the larger well-petioled leaves and smaller non-secund flowers with shorter obliquely large-pored anthers; from the anther form, this species would perhaps be better placed in Sect. Chaenanthera. On St. Lucia, there is a population (Proctor 17726, Cowan 1575, Cowan 1559), mistakenly distributed in herbaria as M. trichotoma, which suggests M. ernstii in reproductive features (secund flowers, well-prolonged connective); however the St. Lucia plants show much larger

well-petioled leaves with developed laxly reticulate tertiary veins; probably an undescribed species overlooked by earlier students of the Melastomataceae is represented. M. martinicensis Cogn. vegetatively has somewhat the aspect of M. ernstii, but differs at least in the apically rounded leaf blades; only sterile and fruiting collections (Duss 672, Hahn 1174) of this species, placed by Cogniaux in Sect. Cremanium, have been seen by me.

MICONIA LOREYOIDES Triana

M. killipii Gleason, Bull. Torrey Club 52: 387. 1925.

Despite Triana's statements, direct and implied, about glabrous filaments and style in Triana 4029, Macbride's excellent photograph (25982) agrees in all visible details with the various collections of M. killipii; especially significant in the photograph are the tendency to incrassate stem nodes, the lobed calyx, and the anther and stigma shapes. Also there is a Triana Chocó specimen (404, NY), perfectly consonant in buds with M. killipii but having glandular filaments (the style not seen), which had been matched at Kew by N. L. Britton under M. loreyoides; the Triana specimen, which is perhaps a misnumbered isosyntype, also agrees in visible details and other label data with Triana 6258 (BM, New York photograph N.S.5610) annotated by Triana. A recent Ecuadorian collection of M. loreyoides is Asplund 16745 (S), from between El Volante and the Pilatón bridge, Pichincha, elev. 1700 m. It is especially unfortunate that Gleason's commemorative epithet should disappear into synonymy.

MICONIA GONIOSTIGMA Triana

M. megastigma Gleason, Bull. Torrey Club 68: 250. 1941.

Skutch 4558 represents a somewhat less pubescent phase of M. goniostigma, but with no other vegetative or floral variation. Both the quite pubescent and somewhat glabrescent forms are present on both sides of the Andes in Colombia and Ecuador. The following specimens with a reasonably compact spectrum of pubescence density have been examined:

Colombia. El Valle, Killip & Garcia 33936, Killip & Cuatrecasas 38770; Caquetá, Cuatrecasas 9044.

Ecuador. Esmeraldas, Mexia 8414, 8453; Leon, Mexia 6687; Napo-Pastaza, Skutch 4558, Fagerlind & Wibom 1142(S), Asplund 9529(S), 19425(S). The population around Mera, Napo-Pastaza (Harling 3399, Asplund 18431, Asplund 18696) is a quite glabrescent node in M. goniostigma, with setulose petioles, appressed-ciliate leaf blades very sparsely setulose beneath, very sparsely setulose inflorescence branches, and esetulose hypanthia.

M. goniostigma is very closely related to M. loreyoides despite the normal disparity in pubescence, there seemingly being no internal floral features for differentiation. The well-developed leaf blades in M. goniostigma are 7-nerved and the bracts and bracteoles rather persistent; in M. loreyoides, the leaf blades are 5-nerved and the bracts and bracteoles early-caducous in bud. The closest approach to M. loreyoides from

M. goniostigma is represented by Camp E-609 (NY), from dense rainforest in the Moro-Moro region 30 km west of Portovelo, El Oro, Ecuador; this collection shows 7-nerved caducously ciliolate leaf blades which are very caducously strigulose, rather persistent bracts and bracteoles, but no simple setae on the stems, inflorescence, or hypanthia. M. pichinchensis Benth. has the general aspect of a small-leaved form of the glabrescent element of M. goniostigma; however, the anthers are proportionately narrower and exappendiculate, the styles are elongate, and the stigmas are only minutely expanded (less than 1 mm diam.).

MICONIA FLORIBUNDA (Bonpl.) DC.

Wurdack 1057, from montane rainforest along the Yambrasbamba-Pomacocha trail between Yambrasbamba and Yanayacu, elev. 2200-2300 m, seems to be the first record for Peru, at least in the sense of Colombian material studied by Cogniaux. Unfortunately the Bonpland type collection of this species could not be located at Paris by F. G. Meyer in September, 1964. The two previously known Peruvian species involved in this complex, M. modica Macbr. and M. lasiostyla Gleas., both lack internal hypanthial ribs, as well as showing minor specific vegetative and floral differences.

MICONIA CLIVORUM Wurdack, sp. nov.

Sect. Amblyarrhena. M. hirtae Cogn. et (ex descr. et photic.) M. staphidioidei (Naud.) Tr. affinis, sed floribus breviter pedicellatis stigmatibus expansis.

Ramuli primum paulo compressi demum teretes sicut petioli foliorum venae principales subtus inflorescentia hypanthiaque dense pilis stellulatis vel pinoideis 0.1-0.2 mm longis obsiti et modice (vel in inflorescentia hypanthiisque modice vel sparse) pilis gracilibus laevibus erectis vel paulo deflexis in inflorescentia hypanthiisque rare glanduliferis armati. Petioli (2.5-) 3-5(-8) cm; lamina 9-16 X 6-11 cm tenuiter rigida integra vel obscure serrulata subtus obscure foveolata ovata vel elliptico-ovata apice acuto vel paulo (1-2 cm) gradatimque hebeti-acuminata basi truncata vel obscure (ad 7 mm) cordata, 7- vel sub-9-nervata nervis secundariis 3-5 mm inter se distantibus supra paulo obscuris nervulis obscuris sed densiuscule reticulatis, supra modice bullulato-setulosa bullis 0.3-0.4 mm altis setis 0.5-0.8 mm longis, subtus in nervulis dense setulosa. Panicula 8-12 cm longa oblongo-pyramidata multiflora; flores 5-meri 1-1.3 mm pedicellati, bracteolis 0.5-0.7 X 0.1-0.2 mm ad pedicellorum bases insertis ante anthesim valde caducis. Hypanthium (ad torum) 2.2 X 2.3 mm; calycis tubus 0.9 mm altus, lobis interioribus 0.5-0.6 mm altis paulo pellucidis apice rotundato, dentibus exterioribus tuberculiformibus non eminentibus. Petala 2-2.3 X 1.7- 2 mm glabra suborbicularia vel obovata apice rotundato et paulo emarginato. Stamina isomorphica glabra; filamenta 2-2.2 mm; antherarum thecae 1.5-1.8 X 0.6-0.7 mm oblongae poro 0.25 mm diam. ventraliter inclinato, connectivo non prolongato exappendiculato. Stylus 4.5-4.8 X 0.4-0.5 mm basim versus pilis debilibus

eglandulosis 0.1 mm longis sparse obsitus; stigma paulo expansum 0.7 mm diam.; ovarium (3-)4-loculare 1/3-1/2 inferum apice conico et in collum 0.6-0.7 mm altum ca. 0.4 mm 4-lobulatum circum stylum protracto sparse inconspicueque stellulato-furfuraceo.

Type Collection: J. J. Wurdack 1794 (holotype US 2404340; isotype USM; 9 additional isotypes to be distributed), collected on the upper slopes of Puma-urcu just north of Levanto, Prov. Chachapoyas, Depto. Amazonas, Peru, elev. 2700-2800 m, 29 Aug. 1962. "Shrub 2-6 m, occasional; cauline hairs red-tinged. Corolla white."

Paratype: Wurdack 1655, from the middle slopes of Cerro Yama-uma (Cerro Carán) above Taulia, 4-8 km south-southeast of Molinopampa, Prov. Chachapoyas, Depto. Amazonas, Peru, elev. 2700-3000 m, 11 Aug. 1962. "Shrub 3-7 m, frequent but rarely flowering at this time. Petals white."

M. hirta has much sparser upper leaf surface pubescence, more obviously caudate blades, sparsely barbellate stem hairs, and sessile flowers with very sparse hypanthial hairs, remote-based calyx lobes, and a punctiform stigma; however, there is a fundamental linkage to M. clivorum in the underlying stellulate pubescence on the stems and inflorescence, as well as the sporadic gland-tipped inflorescence hairs. The other species of Sect. Amblyarrhena in this alliance (spp. 392-398 of Cogniaux' monograph), most of which also have stellulate pubescence, all differ in obvious vegetative and reproductive features. In Cogniaux' key, M. clivorum would probably run to spp. 384-385 or 389-391; most of these species lack stellulate pubescence and/or flower pedicels, as well as individually differing in other characters. M. ruizii Naud., at present rather enigmatic to me, differs at least in the sessile flowers and completely inferior ovaries with depressed apices; also insofar as Jameson 835 (US) is concerned, the simple cauline hairs are much shorter than in M. clivorum and the filaments and styles are sparsely glandular-puberculous. Incidentally, although the original diagnosis indicated a glabrous style in M. scabra Cogn., the New York isotype (André 3880) shows a strigulose style and prominently setulose ovary apex. M. hamata Cogn., a species not represented by recent collections, differs (ex Macbride photo) in the narrower shortly 7-plinerved leaf blades with much longer lower surface hairs and the sessile flowers; also (fide Gleason notes), the hypanthial pubescence is merely simple and the 3-celled ovary is tipped with 10 bristles 0.4 mm long. M. barbipilis Gleas., the holotype (F) of which has been examined, is not closely related to M. clivorum, having the upper leaf surface bullae tipped with short thick hairs, the stems and inflorescence with only appressed stout densely barbellate hairs, and the flowers considerably larger.

MICONIA BRACHYANTHERA Triana

Wurdack 1058 (montane rainforest along the Yambrasbamba-Pomacocha trail, Prov. Bongará, Depto. Amazonas, Peru, elev. 2200-2300 m, 26 Jun. 1962) has been compared minutely with the

holotype (Mathews 1726, K) and agrees well in all details. The leaf blades are scarcely plinerved, the inner pair of primaries on the lower surface being inserted less than 5 mm above the base; the lower leaf surface and inflorescence hairs are each tipped with a minute caducous gland, discernible only under 50X-100X magnification. M. brittonii Cogn. is extremely close to M. brachyanthera, having the same minute glands on the inflorescence and lower leaf surface hairs, but differs in the moderately roughened (rather than sparsely and obscurely barbellate) cauline hairs and strigulose style; the expanded stigma is perhaps of no specific import if heterostyly exists in this complex.

MICONIA FOSBERGII Wurdack, sp. nov.

M. multuplinerviae Cogn. et M. penicillatae Gleas. in antherarum forma affinis, sed foliis supra planis.

Ramuli quadrati vel sulcato-quadrati ad nodos annulatim incrassati annulo corneo 1-2 mm elevato, primum sicut petioli modice stellulato-puberuli et modice pilis 2.5-4(-5) mm longis ad apicem penicillato-stellatis setosi demum glabrati. Petioli 4-8 cm; lamina 15-25 X 9-14 cm vel ultra chartacea elliptica apice acuto basi obtusa margine serrulato dentibus ca. 2 mm inter se distantibus 0.5 mm altis et ciliolato pilis 0.5-0.7 mm longis incurvo-erectis, 7-9-plinervata nervis subalternatim 0.3-3 cm supra basim insertis nervis secundariis 4-8 mm inter se distantibus tertiariis laxe reticulatis, supra primum densiuscule stellato-puberula et sparse pilis robustis 0.5-2 mm longis siccitate luteis simplicibus obsita demum glabrata, subtus in nervis nervulisque modice et in superficie sparse stellato-puberula. Panicula 10-15 cm longa pyramidata multiflora ramis ramulisque sparse pilis erectis 0.5-1 mm longis ad apicem penicillato-stellatis obsitis sicut hypanthium modice stellato-puberula; flores 5-meri ad ramuli extremitates vel in ramulis capitato-aggregati; pedicelli 0.5-0.8 mm longi ad basim bibracteolati, bracteolis 0.6 X 0.1-0.2 mm acutis ad anthesim plusminusve caducis. Hypanthium 1.8 X 1.8 mm; torus ciliolatus pilis 0.1 mm longis glanduliferis; calycis tubus 0.2 mm altus, lobis interioribus 0.3 mm altis ad basim remotiusculis apice rotundato, dentibus exterioribus tuberculatis non eminentibus. Petala 2.4 X 1.7-2 mm late elliptica glabra apice rotundato. Stamina glabra paulo dimorphica; filamenta 2.2-2.4 mm; antherarum thecae 1.7 mm longae spathulatae apicem versus curvatae ad apicem profunde (0.2-0.3 mm) emarginatae introrse biporosae. Stylus 3 X 0.2-0.3 mm glaber; stigma capitellatum 0.5 mm diam.; ovarium 3-loculare 1/3-inferum apice conico 0.5 mm alto sparse glanduloso-setuloso.

Type Collection: F. R. Fosberg & M. A. Giler 22971 (holotype US 2143072; isotype US), collected in wet forest on a steep slope near Monos, 14 km w.n.w. of Zaruma, Zaruma Basin, Prov. El Oro, Ecuador, elev. 1230-1280 m, 11 Feb. 1945. "Shrub 2 m tall; leaves glaucous beneath. Flowers white."

Both suggested relatives have bullate-setose upper leaf surfaces and non-scutate nodes; all three species have stipitate-

stellate cauline pubescence (although the hairs in M. fosbergii are more robust) and apically curved anthers with deeply emarginate apex. All the other plinerved species of Sect. Amblyarrhena, with the possible exception of M. rivetii Dang. & Cherm., differ in floral details, especially in the anthers; that Ecuadorian species, known to me by the type photograph and several recent incomplete collections, differs at least in the very fine (almost formless) lower leaf surface pubescence and non-scutate nodes. In the search for affinities of M. fosbergii, Sections Chaenopleura, Cremanium, and Chaenanthera were also canvassed because of the distinctive but sectionally inconclusive anthers. M. polyneura Triana, M. saxatilis Macbr., M. polygama Cogn., M. valida Cogn., and (ex descr.) M. rhonhofiae Mgf. all seem to have a few vegetative characters in common with M. fosbergii, but differ in floral features.

MICONIA PARADISICA Wurdack, sp. nov.

Sect. Cremanium. M. pulverulentae R. & P. affinis, sed foliis 3- vel sub-5-nervatis subtus pilis stipitato-stellatis armatis alabastrorum hypanthiis glabris.

Ramuli primum obtusi-quadrangulati demum teretes sicut petioli inflorescentiae ramique primum modice pilis stellulatis 0.1-0.2 mm altis obsiti tarde glabrati; petioli 1-2 cm; lamina 7-13 X 3-6 cm chartacea elliptica vel paulo obovato-elliptica apice anguste hebeti-acuto basi late obtusa vel paulo rotundata margine integro et distanter (1.5-3 mm) appresso-ciliolato, trinervata (jugo tenui inframarginali neglecto), nervis secundariis 3-5 mm inter se distantibus sicut tertiariis supra obscure impressis subtus paulo elevatis nervulis reticulatis areolis ca. 0.4-0.5 mm latis, supra primum sparse stellulato-puberula mox (costa excepta) glabrata, subtus in nervis primariis dense stellulato-puberula et pilis barbellatis vel stipitato-stellatis 0.3-0.5 mm longis armata in nervulis pilis stellatis (0.3-) 0.4-0.5 mm stipitatis modice obsita in superficie vera glabra. Panicula 7-10 cm longa late pyramidata; flores 5-meri in ramulis interrupto-glomerati paene sessiles, bracteis bracteolisque 0.5-1 mm longis ovato-lanceolatis sparse furfuraceis usque ad anthesim persistentibus. Hypanthium (ad torum) 1.3 X 1.4 mm glabrum; calycis tubus 0.3 mm altus, lobis interioribus 0.4 mm altis late ovatis ad basim remotis apice plerumque rotundato, dentibus exterioribus callosis acutis non eminentibus. Petala glabra 1.1-1.3 X 0.8-0.9 mm obovato-oblonga apice rotundato et emarginato. Stamina glabra in dimensionibus minute anisomorphica; filamenta 1.3-1.5 mm; antherarum thecae 0.7-0.8 X 0.3-0.4 mm apice late biporoso, connectivo usque ad filamenti insertionem 0.3-0.4 mm prolongato minute bilobulato 0.3 mm lato oblongo. Stylus 1.5 X 0.15 mm glaber paulo exsertus; stigma 0.25 mm diam.; ovarium abortivum apice pilis 2-3 barbellatis 0.1 mm longis ornato.

Type Collection: J. J. Wurdack 1055 (holotype US 2404249; isotype USM; 3 additional isotypes to be distributed), collected

at the edge of the montane rainforest along the Yambrasbamba-Pomacocha trail (between Yambrasbamba and Yanayacu), Prov. Bongará, Depto. Amazonas, Peru, elev. 2200-2300 m, 26 June 1962. "Shrub 3-6 m, occasional. Flowers white."

M. pulverulenta has distinctly 5-7-nerved leaf blades, the lower surface and veinlet hairs being sessile or imperceptibly (to 0.1 mm) stalked; the densely roughened cauline hairs are often 0.7 mm long and the young hypanthia are sparsely stellulate-puberulous. Probably M. pulverulenta is dioecious, the type collection (fide Macbride photo 17144 and Cogniaux' description) having well-developed anthers and a scarcely expanded stigma, while recent collections (cited by Macbride and agreeing very well vegetatively with the Ruiz collection) have semi-abortive anthers and capitellate stigmas. Wurdack 1055 is male, the abortive ovaries being barely raised above the hypanthial floor; the specific epithet refers to the type locality, abounding in melastomes. Other close relatives of M. paradisica are M. valida Cogn. (with much larger leaves and slightly larger flowers, the hypanthia caducously furfuraceous), M. saxatilis Macbride (with larger basally attenuate shortly triplinerved leaf blades, more compact lower leaf surface pubescence, and early-furfuraceous hypanthia), and M. galactantha Naud. (with, ex descr. and Macbride photo 17165, sharply 4-angled stems and much less congested flowers). Both M. tiri Triana and M. coelestis Naud. have much larger flowers and different foliage; Naudin remarked (in his description of the misidentified M. pulverulenta) that the Dombey collection had one-pored anthers and a recent Huánuco collection (Woytkowski 7998), agreeing perfectly with Macbride's photograph (26039) of M. tiri, shows anthers of Sect. Amblyarrhena rather than Cremanium.

MICONIA PENNINGTONII Wurdack, sp. nov.

Sect. Cremanium. M. plethoricae Naud. affinis, sed ramis ad nodos non dilatato-compressis ramulorum petiolorumque pilis erectis ad apices non penicillatis, floribus plerumque 4-meris.

Ramuli primum obtuse quadrisulcati demum teretes sicut petioli pedunculusque modice pilis erectis 1.5-2(-3) mm longis basim versus imperspicue muriculatis plusminusve persistentibus armati et sicut inflorescentiae ramuli modice vel densiuscule pilis pinoideis (i. e. dense barbellato-muriculatis) 0.2-0.5 mm longis demum caducis obsiti. Petioli 2-3.5 cm; lamina 11-17 X 5-7 cm subcoriacea apice breviuscule (ca. 1 cm) gradatimque hebeti-acuminato basi obtusa vel rotundata margine integro et ciliolato pilis 0.5-0.7 mm longis erectis vel paulo appressis ca. 2 mm inter se distantibus, 5-nervata jugo exteriore debili inframarginali nervis secundariis tertiariisque supra obscure impressis secundariis 5-7 mm inter se distantibus nervulis subtus planis laxe reticulatis areolis ca. 0.5 mm latis, supra glabra et nitidula, subtus primum dense pinoideo-puberula pilis 0.1(-0.3) mm longis demum in superficie glabrata. Inflorescentia 10-12 cm longa multiflora; flores 4(-5)-meri in ramulis conferti plerumque sessiles (interdum ad 1 mm pedicellati) bracteolis 1-1.5 X 0.15-0.2 mm linearibus furfuraceis mox (ante anthesim) caducis. Hypanthium (ad torum) 2 X 2 mm primum sparse stellulato-furfura-

ceum mox glabratum; calycis tubus 0.3 mm altus, lobis interioribus 0.6 mm altis apice rotundato, dentibus exterioribus callosis non eminentibus. Petala (sub lente) minutissime granulosa 1.5-1.6 X 1.2-1.3 mm obovata apice asymmetrice truncato vel rotundato. Stamina isomorphica glabra; filamenta 2.8-3 mm; antherarum thecae 1.9-2.1 X 0.45 X 0.6-0.7 mm oblongae vel paulo obovato-oblongae late biporosae, connectivo ad basim ventraliter minute bilobulato dorsaliter imperspicue (0.1 mm) elevato. Stylus 4 X 0.4 mm glaber exsertus; stigma paulo expansum 0.6 mm diam.; ovarium 2-loculare 1/3 inferum glabrum apice conico 0.5 mm alto et in collum 0.5 mm altum circum stylum protracto.

Type Collection: P. C. D. Cazalet & T. D. Pennington 5602 (holotype US 2405349; isotype NY), collected in dwarf forest on the Oriente trail E.N.E. of Cayambe Mountain, Prov. Napo-Pastaza, Ecuador, elev. 2900 m, 15 Dec. 1961. "20' tree, little-branching. Leaves with golden-brown meal below. Corolla greenish white, stamens pale cream."

M. plethorica (see Cuatrecasas & Jaramillo 12012, US) has notably compressed-dilated branch nodes, stem hairs frayed at the apex, and leaf margin teeth merely callose. Other close relatives include M. orcheotoma Naud. (with much shorter and apically barbellate stem hairs, as well as densely stellulate-puberulous hypanthia), M. pastoensis Triana (with much shorter and apically densely barbellate stem hairs, smaller leaf blades, and pedicellate flowers), M. polyneura Triana (with glabrate branchlets and pedicellate flowers), and M. cladonia Gleason (with stem and lower leaf surface hairs branched and with spicules 0.1-0.3 mm long, as well as relatively broader anthers). More remote relatives in Sect. Cremanium include M. hygrophila Naud., M. purulensis D. Sm., M. tuckeri Gleason, M. vitiflora Macbr., and M. pulverulenta R. & P. Of the 13 flowers counted in M. penningtonii, 11 were 4-merous and the remainder 5-merous; despite this predominance of 4-mery, the relationships do not seem at all to be with species 482-485 of Cogniaux' arrangement.

MICONIA JENTACULORUM Wurdack, sp. nov.

In systema Cogniauxii de speciebus 434-436 differt foliis minoribus hypanthiis maioribus.

Rami obtuse quadrangulati demum teretes sicut petioli foliorum juvenilium costae supra inflorescentiaque pilis barbellatis gracilibus cinereis 0.5-0.7(-1) mm longis dense obsiti pilorum parte apicali demum caduca. Petioli 5-8 mm longi; lamina 2-4(-4.5) X 1.3-2.5 cm elliptica vel ovato-elliptica crasse rigida apice late hebeti-acuto vel anguste hebeti-obtuso basi rotundata vel paulo (ad 2 mm) cordata auriculis basalibus proximis margine revoluto et obscure serrulato, paulo (ca. 1 mm) triplinervata (jugo inframarginali obscuro neglecto) nervis secundariis 1.5-2 mm inter se distantibus supra obscure impressis subtus crasse elevatis tertiariis supra obscuris subtus crasse elevatis et reticulatis, utrinque primum dense pilis barbellatis 0.2-0.4 mm longis obsita supra (costa excepta) mox glabrata subtus persistenter puberula pilis ca. 0.1 mm longis barbellatis. Inflores-

centia 2-3 cm longa confertiflora, bracteis bracteolisque 2-3 X 0.3-0.5 mm paulo puberulis conspicuis ad anthesim caducis; flores 5-meri sessiles. Hypanthium (ad torum) 2.7 X 2.6 mm dense pilis barbellatis 0.1-0.2 mm longis obsitum; calycis tubus 0.2-0.3 mm altus, lobis interioribus 0.6 mm longis oblongis apice rotundato, dentibus exterioribus inconspicuis appressis non eminentibus. Petala glabra 2.3-2.4 X 1.4 mm obovato-oblonga apice oblique rotundato et vix retuso. Stamina inconspicue dimorphica glabra; filamenta 2-2.1 mm; antherarum thecae 1.4-1.5 X 0.5 mm vel 1.2-1.3 X 0.6 mm oblongae ad apicem late (0.4 mm) biporosae, connectivo ad basim dorsaliter inconspicue (0.1 mm) hebeti-dentato ventraliter 0.25-0.3 mm prolongato et paulo bilobulato. Stylus 4 X 0.4 mm glaber; stigma paulo clavatum 0.5-0.6 mm diam.; ovarium 3-loculare paulo inferum apice in collum conicum 0.8-1 mm altum minutissime setulosum circum stylum protracto.

Type Collection: J. Cuatrecasas 13530 (holotype US 1852466; isotype NY), collected in the Páramo del Almorzadero "extrema sur en Peralonso", Cordillera Oriental, Depto. Santander, Colombia, elev. 3100 m, 28 Nov. 1941. "Frutex. Pétalos y estambres blanco-amarillentos."

Paratype: same locality data, fruiting, 19 Jul. 1940, Cuatrecasas & Garcia Barriga 9925 (US).

While M. jentaculorum has somewhat the vegetative aspect of M. rigens Naud., it does not seem florally closely related. The sessile flowers would key the Peralonso endemic to M. bracteolata (Bonpl.) Naud., M. hygrophila Naud., and M. caelata (Bonpl.) DC., all of which have smaller flowers (hypanthium to the torus 1-1.3 mm long) and quite different larger leaves. In pubescence, perhaps M. hygrophila and also M. elaeoides Naud. are the closest relatives; the latter species differs in the much thinner glabrescent leaves and glabrous smaller hypanthia. The specific epithet chosen for M. jentaculorum refers to the type páramo.

MICONIA DIELSII Markgraf ex char.

This Ecuadorian species seems to show heterostyly (dioecism?). A female flowering collection (Hitchcock 21824, from between Baños and Casnurco, Tungurahua) has abortive anthers and a capitate stigma on a well-exserted style; male material (Skutch 4514, from Puyo, Napo-Pastaza, originally distributed as M. brevitheca Gleason) shows well-developed anthers, but a scarcely exserted style with minute barely expanded stigma. A fruiting collection is Asplund 19470 (S) from Vera Cruz, Napo-Pastaza. Very minute red-brown sessile glands are frequent on the hypanthia and inflorescence branches, as well as occasionally tipping the spicules of the rather scurfy tiny dendritic inflorescence hairs.

MICONIA PALUDIGENA Wurdack, sp. nov.

Sect. Cremanium. M. salicifoliae (Bonpl.) Naud. affinis, sed foliis usque ad apicem distincte trinervatis subtus in superficie glabris, calycis dentibus exterioribus paulo eminentibus.

Ramuli teretes sicut petioli inflorescentiaque primum dense pilis dense barbellatis 0.1-0.3 mm longis ad basim crassis primum

ravis demum fuscis armati. Petioli 1.5-2 mm; lamina 10-15(-20) X 4-6 mm rigida integra apice acuto basi late acuta, supra glabra, subtus in venis primariis sparse vel modice furfuracea in venis secundariis primum sparse furfuracea mox glabrata, trinervata nervis primariis supra conspicue impressis subtus elevatis nervis secundariis supra obscuris subtus evolutis et ca. 0.3-0.5 mm inter se distantibus tertiariis non evolutis. Paniculae numerosae racemiformes paulo declinatae 3-7-florae furfuraceae; flores 4-meri ca. 2 (demum usque ad 3) mm pedicellati, bracteolis subpersistentibus 2 X 1 mm ovato-lanceolatis ca. 0.4 mm infra hypanthii basim insertis. Hypanthium (ad torum) 2-2.2 X 2 mm primum praecipue basim versus sparse furfuraceum demum glabratum; calycis tubus 0.2 mm altus, lobis interioribus 0.3 mm altis triangularibus ad basim remotis, dentibus exterioribus 0.1-0.2 mm eminentibus ad apicem setiformibus. Petala granulosa 1 X 1.4 mm oblata apice rotundato. Filamenta 1.3-1.5 mm longa basim versus glabra apicem versus (ad connectivi insertionem) dorsaliter sparse glanduloso-puberula; antherarum thecae 1 X 0.8 mm late biporosae, connectivo ad apicem ca. 0.4 mm eminente dorsaliter ad basim paulo (0.1 mm) elevato non appendiculato. Stylus 2.7 X 0.25 mm densiuscule puberulus pilis 0.1-0.2 mm longis glanduliferis; stigma 1.3-1.5 mm longum ovoideum; ovarium 2-loculare 1/2 inferum apice conico 0.5-0.7 mm alto modice setuloso setulis 0.2-0.3 mm longis p. p. glanduliferis.

Type Collection: J. J. Wurdack 1218 (holotype US 2404271; isotype USM; 4 additional isotypes to be distributed), collected in an open cold swamp on the summit of the Cerros Calla-Calla, between Balsas-Leimebamba road pass and the camino de herradura (2 hours walk south), Prov. Chachapoyas, Depto. Amazonas, Peru, elev. 3500-3750 m, 8 Jul. 1962. "Shrub 1 m, occasional. Fruit purplish."

M. salicifolia has longer leaves which are faintly 3-nerved basally and densely tawny-furfuraceous beneath, densely furfuraceous hypanthia, and infra-marginal external calyx teeth. Perhaps a closer relative, at least vegetatively, is an undescribed Ecuadorian species (to be based on Prieto P-312), which has 1-nerved leaf blades. The other 4-merous species of Sect. Cremanium in Cogniaux' monograph, M. vaccinoides (Bonpl.) Naud., at least as far as the type photograph and Weberbauer collections (F) indicate, has proportionately wider leaves with laxer secondary veins, amorpho-squamulose soon glabrate young branchlets, and longer oblong interior calyx lobes with blunt non-projecting external teeth. Another undescribed species in this alliance was collected on Puma-urcu above Chachapoyas (Wurdack 787) and resembles vegetatively M. ledifolia (DC.) Naud., but with 4-merous fruits similar to those of M. salicifolia. Unfortunately, and not as in M. paludigena, flower remnants are completely lacking for the Puma-urcu shrub.

MICONIA BULLATA (Turcz.) Triana

M. trichocaula Macbr., Field Mus. Publ. Bot. 4: 189. 1923.

After comparison of Mathews 873 (K) with Weberbauer 6094 (US), there seems no valid separation of the two taxa; the Kew material shows abundant simple cauline hairs as well as scurfy-plumose ones. M. bullata is now also known from Ecuador (Prieto P-287) and Amazonas, Peru (Wurdack 1705).

MICONIA SECUNDIFOLIA Cogn. subsp. MALCABALENSIS Wurdack, subsp. nov.

A subsp. typica petiolis laminis floribusque minoribus, laminis plerumque ellipticis vel paulo ovato-ellipticis trinervatis venis tertiariis subtus planis vel paulo impressis differt.

Type Collection: J. J. Wurdack 1419 (holotype US 2404299; isotype USM; 5 additional isotypes to be distributed), collected on the summit of Cerro Malcabal (Cerro Tumbe) 3-6 km southwest of Molinopampa, Prov. Chachapoyas, Depto. Amazonas, Peru, elev. 2850-2900 m, 20 Jul. 1962. "Shrub 2 m. Corolla white; anthers yellow."

In the typical subspecies, collected by Weberbauer on the eastern slopes of the eastern cordillera, the petioles are 1.2-2 cm long and the ovate leaf blades 6.5-10 X 4.5-5.5 cm; the tertiary veins on the lower leaf surface are prominently reticulate-raised and the hypanthium plus calyx tube (dry) is 3.2-3.4 mm long. In the Malcabal shrubs, the petioles are 0.4-0.7 cm long, the leaf blades 3-4.2 X 1.8-2.3 cm, and the hypanthium plus calyx tube (dry) 2.6-2.8 mm long. Despite the disparity in superficial aspect, subsp. malcabalensis seems to be only a higher-elevation exposed-habitat variant of the typical subspecies. Subsp. secundifolia is still known to me only from the type collection; Macbride's excellent photograph (17159) and Gleason's notes from the Berlin specimen are sufficient for the species-level disposition of the Malcabal population. The Cogniaux epithet is probably inappropriate for the living plants, the secund leaves apparently being the result of specimen preparation and not seen in Wurdack 1419. M. nigricans is a close relative of M. secundifolia, but has much finer pubescence, proportionately narrower leaves, and somewhat smaller flowers with much less developed calyx teeth. Apart from the Tambo Ventillas type, M. nigricans is also known from the middle eastern Calla-Calla slopes (Wurdack 1261). Both species differ from the usual species of Sect. Chaenopleura in the very narrow dehiscence of the anther thecae (extending for about 3/4 of the thecal length) and are somewhat suggestive of Sect. Chaenanthera.

TOCOCA SYMPHYANDRA (Triana) Cogn.

Tococa variegata Mgf., Notizbl. Bot. Gart. Berlin 15: 379. 30 Mar. 1941.

Miconia barbicaulis Gleason, Bull. Torrey Club 68: 248. 1 Apr. 1941.

Gleason's notes on the Kew material (Triana 4102, Kalbreyer 1836) and Triana's floral sketches (K) have confirmed the identity of Haught 5224 and 5225 (both from west of Tambo, Cauca, Colombia, elev. 1100 m, somewhat north of the type locality but on the

western flank of the western cordillera). The following Ecuadorian collections (all Napo-Pastaza) are the same species as is represented by Haught's collections: Skutch 4420 (US) and Fagerlind & Wibom 1167 (S), Puyo; Harling 3269 (S), Canelos; and Harling 3388 (S), Mera. Haught's collections show forms with green (5225) and purple-tinged (5224, deep red in vivo fide Haught) lower leaf surfaces. Harling 3388 and Fagerlind & Wibom 1167 have green leaves, while the other two Ecuadorian collections are like Haught 5224. The upper leaf surface hairs (i. s.) vary from yellow to castaneous. Probably these color forms are analogous to those in Clidemia allardii Wurdack (Phytologia 9: 425. 1964). Markgraf's excellent description, plus later Ecuadorian collections, leaves no doubt as to the synonymization of T. variegata; Gleason's notes indicate that Berlin did not have T. symphyandra represented in its collections, at least in 1930. Perhaps a legalistic purist would care to designate a neotype for T. variegata, but this scarcely seems necessary. As suggested by Markgraf, T. parviflora Spruce ex Triana, also with a hyaline apiculate calyx cone rupturing rather irregularly, is perhaps the closest relative within Tococa, but with quite differently shaped anthers. Admittedly the anther shape may eventually impel placement in Miconia, with reversion then to Triana's basionym. The white foliar macules noted by Markgraf are especially prominent in Skutch 4420, less so and less regular in the other collections; these pale regions are not phanerogamogenetic but rather, fide Dr. Harold Robinson, colonies of a septate fungus.

CLIDEMIA DENSIFLORA (Standl.) Gleason

Two Ecuadorian collections (Asplund 18620, 19602) from Mera, Napo-Pastaza, agree in all essential details with the six Central American specimens available for study. The Mera sheets show somewhat firmer leaves than most, but not all, of the more northern specimens. As noted in the discussion of C. chocoensis (Phytologia 7: 238. 1960), the species seems well accomodated within Clidemia, but certainly neither in Henriettella nor (even further astray) Henriettea.

CLIDEMIA URIBEI Wurdack, sp. nov.

C. obliquae (Griseb.) Cogn. affinis sed ramulis teretibus foliis distincte cordatis supra pustulatis.

Ramuli primum paulo compressi demum teretes sicut petioli foliorum venae principales subtus primum modice setulosi pilis gracillimis flexuosis demum plusminusve deflexis 0.7-1 (vel in petiolis ad 1.5) mm longis demum glabrati et inconspicue caduceque stellulato-furfuracei. Petioli 2-4(-6) cm; lamina (7-)9-14 X 4-9 cm fragilis tenuis ovata vel anguste ovata apice acuto vel gradatim acuminato basi (2-)4-8 mm cordata margine distincte ciliolato-serrulato dentibus hebetibus 1-1.5 mm profundis et 2-3(-4) mm inter se distantibus, 7-nervata nervis secundariis 3-4 mm inter se distantibus tertiariis nervulisque reticulatis, supra distincte pustulata et strigulosa pilis laxis 0.3-1 mm longis, subtus in nervulis sparse setulosa pilis gracilibus laxis.

Flores in foliorum axillis congesti numerosi plerumque 4-meri breviter (ca. 0.5 mm) pedicellati, bracteolis ad pedicelli basim insertis 0.3-0.5 X 0.2-0.3 mm lanceolatis persistentibus. Hypanthium (ad torum) 2.3-2.5 mm sparsissime vel modice setulosum pilis 0.2-0.3(-0.5) mm longis et praecipue basim versus sparse stellulato-puberulum; calycis tubus 0.4-0.5 mm altus, lobis interioribus inconspicuis 0.3 mm altis apice rotundato, dentibus exterioribus 0.5-0.9 mm eminentibus oblongo-triangularibus apice setuloso. Petala glabra 1.8-2 X 0.9-1 mm oblonga apice emarginato-truncato. Stamina isomorphica glabra; filamenta 2.2-2.9 mm; antherarum thecae 2-2.3 mm longae ad apicem ventraliter minute (0.1 mm) uniporosae, connectivo exappendiculato non prolongato. Stylus 6.8 X 0.25-0.3 mm glaber; stigma truncatum non expansum; ovarium 2(-3)-loculare omnino inferum apice glabro et paulo excavato.

Type Collection: Lorenzo Uribe Uribe 3910 (holotype US 2371598; isotype COL), collected in Caño Garrapato, Tauramena, Casanare, Colombia, elev. 600 m, 2 Dec. 1961. "Arbustillo de 1.5 m de altura, muy ramoso. Flores blancas y frutos violáceas."

Paratypes (all Colombia): Uribe 4286, from Río Caja, Tauramena, Casanare, elev. 500-550 m. "Arbusto de 1 metro de altura. Corola blanca."; Uribe 3776, from Quebrada Cañoseco 4 km north of Tauramena, Casanare, elev. 500 m. "Arbusto delgado de 1-2 metros de altura. Follaje de un color verde satinado muy elegante. Flores blancas."; Cuatrecasas 4505 (F, US), from Villavicencio, Meta, elev. 500 m; S. G. Smith & J. M. Idrobo 1564 (US), from a sandstone outcrop 2 km east of Río Zanza above junction with Río Güejar, north end of Cordillera Macarena, Meta, elev. 500 m. "Herb, woody at base, 0.5 m tall; flowers white."

C. obliqua has quadrate slightly wing-angled stems, with leaf blades merely rounded at the base and plane on the upper surface. C. acutifolia Cogn. has non-bullulate leaf blades and a slightly evolved cymose inflorescence. The other species known to me in this complex, C. fissinervia Gleason, is intermediate in so many features between the above-mentioned pair that it may well represent a hybrid in the species populations around Mapiri, Bolivia; another puzzling element is represented by Buchtien 1053, with esetulose veins on the lower leaf surface and cauline nodes without an interpetiolar line, but otherwise as in C. obliqua. One notable feature in C. obliqua (also true in Buchtien 1053) is the presence of short glandular hairs on the hypanthium which become obvious on the fruit by stalk elongation after anthesis.

One species placed in this complex by Cogniaux, C. rariflora (Bonpl.) Cogn. (the name a later homonym), is known to me only by the description, but surely differs from C. uribei (plane leaves, inflorescences 3-6 cm long). Perhaps because of the fasciculate flowers, C. uribei would key in Cogniaux' monograph to C. petiolata DC. or C. micrantha Sagot; the former has somewhat longer plane leaf blades which are glabrous beneath and have the inner pair of primaries inserted above the base, as well as glandular-setulose hypanthia. C. micrantha (Sagot 1143, BR) differs in the finer

(0.5-0.8 mm deep) leaf margin serrations, plane upper leaf surfaces, and rather densely short-setose (hairs 1.2-1.7 mm long) hypanthia; only one bud is present on the isotype, so other floral differences could not be established. C. aphanantha (Naud.) Sagot differs from C. uribei, at least as far as Poeppig 2511 (US) shows, in the partly glanduliferous (as well as denser and longer) hypanthial pubescence, setuliferous ovary apices, and plane upper leaf surfaces. At the moment, type material is not at hand to evaluate R. O. Williams' treatment (Flora of Trinidad & Tobago) of C. debilis (Crueg.) Cogn. to include C. aphanantha and C. bonplandii (Naud.) Cogn.

In Cuatrecasas 4505, three 5-merous flowers were seen, but the other six observable flowers in this collection were 4-merous as were all the discernible flowers in the other collections; the Villavicencio collection also is more glabrescent than the other materials. It is meet that Padre Uribe's name should be commemorated in the Melastomataceae, his own meticulous studies having clarified puzzling problems in the Colombian flora; his well-prepared specimens all-too-often have been sources of Dullesian reappraisal for me and only infrequently easy of determination.

LOREYA UMBELLATA (Gleason) Wurdack, comb. nov.

Bellucia umbellata Gleason, Bull. Torrey Club 58: 257. 1931.

Both L. arborescens (Aubl.) Naud. and L. acutifolia Berg ex Triana are very similar in floral structure to L. umbellata; all have anthers bipored, the pores very close together at the connective end, and more-or-less thickened regions on the adaxial sides of the petals about 1/4-1/3 below the apex, as well as some development of lateral flanges on the petals at this callused region. L. arborescens is the generotype; certainly for the three above-mentioned species, there is no justification for union with Bellucia. Rather, the closest generic affinities of Loreya are with Henriettea and Henriettella. L. umbellata is amply distinct vegetatively from its closest relatives; there is some slight variability in flower and stigma size, but not of subspecific significance. The species range includes Colombia (Rhodora 65: 18. 1963), Ecuador (20 km west of Santa Domingo de los Colorados, Pichincha, Cazalet & Pennington 5049; Quininde, Esmeraldas, Little 6223), and northeastern Peru.

BLAKEA BRACTEATA Gleas. subsp. ECUADORENSIS Wurdack, subsp. nov.

A subsp. bracteata foliis subtus in costa basim versus sparsissime setulosis in venis secundariis superficieque glabris, bracteis exterioribus extus glabris differt.

Type Collection: P. J. Grubb, J. R. Lloyd, T. D. Pennington, & T. C. Whitmore 93 (holotype US 2369301), collected at the forest edge at Talag, 15 km SSW of Tena, Prov. Napo-Pastaza, Ecuador, elev. 600 m, 9 Jul. 1960. "Liana, flowers pink."

Paratype: Grubb et al 59, from the same locality, elev. 750 m.

The typical subspecies has the lower leaf surfaces and outer bracts both without and within moderately fine-setose. In subsp.

ecuadorensis, the young branchlets, petioles, and pedicels are sparsely and caducously fine-setose; the external bracts are very sparsely fine-setose marginally inside. In floral characters, the two subspecies are the same, with calycine and corollar hairs caducously gland-tipped. The typical subspecies has now also been collected in Ecuador at Canelos, Napo-Pastaza (Harling 3309, S). B. hispida Mgf. must be rather similar to B. bracteata, but differs in the hispid hypanthia and setulose ovary apices.

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MATERIALS TOWARD A MONOGRAPH OF THE GENUS VERBENA. XXVIII

Harold N. Moldenke

VERBENA URTICIFOLIA L.

Additional bibliography: Moldenke, Phytologia 11: 315, 316, & 326--357. 1954.

Additional citations: ILLINOIS: Winnebago Co.: E. W. Fell 51324 (Il--38585); Fell & Fell F.46531 (Il--20632); Fuller & Haime 271fa (Il--15812), 2534h (Il--15809). Woodford Co.: V. H. Chase 9991 (Ur, Ur, Ur, Ur); G. N. Jones 14299 (Ur). County undetermined: Collector undesignated s.n. [Boewe] (Il--15804); Vasey 3 (Il--16007). INDIANA: Allen Co.: C. C. Deam 1362 (Dm). Boone Co.: Friesner 16989 (Bt--62551); S. McCoy 5293 (Bt--51739); A. R. Moldenke 805 (Lw), 806 (Lw). Cass Co.: C. C. Deam 51078 (Dm). Clark Co.: C. C. Deam 23792 (Dm). Clay Co.: S. M. Deam s. n. [C. C. Deam 13868] (Dm). Clinton Co.: Ek s.n. [8-27-1941] (Bt--57380). Crawford Co.: Friesner 11815 (Bt--36886). Decatur Co.: C. C. Deam 58272 (N). Elkhart Co.: C. C. Deam 50429 (Dm). Franklin Co.: Friesner 12448 (Bt--42140); S. McCoy 4172 (Dp--4663). Fulton Co.: Friesner 23098 (Ca--803863, Ok, S, St). Gibson Co.: Schneck s.n. [July 1888] (Dm). Greene Co.: Friesner 22932 (B, N). Hamilton Co.: Friesner 6044 (Bt--13456); A. R. Moldenke 21912 (Lw). Hancock Co.: Friesner 18618 (N). Harrison Co.: C. C. Deam 41511 (Dm); G. Een s.n. [16.7.1950] (S). Hendricks Co.: Friesner 17081 (Bt--61356). Henry Co.: H. N. Moldenke 21911 (Lw). Howard Co.: C. C. Deam 58234 (N); Ek s.n. [7-24-1935] (Bt--42527), s.n. [7-29-1936] (Bt--42528); Friesner 11674 (Bt--37459). Jasper Co.: C. C. Deam 42039 (Dm); Welch 202 (Dp, Ur, Ur). Jefferson Co.: M. S. Coulter s.n. [Hanover, 1873] (Pu); C. C. Deam 47453 (Dm). Jennings Co.: C. C. Deam 58280 (N, Ok); S. McCoy 417 (Dp--4675). Knox Co.: C. C. Deam 51479 (Dm). Kosciusko Co.: Friesner 12664 (Bt--41724). Lagrange Co.: C. C. Deam 51033 (Dm); Friesner 15639 (Bt--55058). Lake Co.: Lansing 2806 (W--753090). Laporte Co.: C. C. Deam 43723 (Dm); Friesner 14991 (Bt--52373); W. H.

Rhoades s.n. [near Westville, July 1934; H. N. Moldenke 17075] (Br, Bt, N, St). Lawrence Co.: Wible 83 (In—4605); Wynn 90 (Au, Gu—27690). Madison Co.: Friesner 17407 (Bt—62513); S. McCoy 2236 (Dp—13911); A. R. Moldenke 803 (Lw, Ut). Marion Co.: H. H. Bartlett s.n. [July 22, 1903] (Mi); Friesner s.n. [7-15-25] (Bt—2477); W. H. Rhoades s.n. [Indianapolis] (Hs). Marshall Co.: Evermann 686 (W—357535); Scovell & Clark 686 [54] (Du—9537). Miami Co.: Ek s.n. [8-16-1936] (Bt—42526). Monroe Co.: Gullion s.n. [Ellettsville] (In—3316); Lewis & Brown s.n. [Bloomington] (Au); Lipps s.n. [July 3, 1941] (Ok); Welch & Price 145 (In). Montgomery Co.: Friesner 3133 (Bt—6964). Morgan Co.: Weatherwax s.n. (In—922). Newton Co.: C. C. Deam 50597 (Dm); M. McKee 1345 (Dp). Noble Co.: C. C. Deam 34615 (Dm); Friesner 12634 (Bt—41405). Ohio Co.: Friesner 12153 (Bt—43914). Owen Co.: Friesner 4565 (Bt—12051). Parke Co.: W. H. Duncan 180 (H—7807). Pike Co.: C. C. Deam 52667 (Dm). Posey Co.: C. C. Deam 35153 (Dm). Putnam Co.: Grimes 736 (Dp); McDougal s.n. [7-29-89] (Dp); Yuncker 1264 (Dp). Ripley Co.: Friesner 12364 (Bt—43922). Shelby Co.: S. M. Deam s.n. [C. C. Deam 13708] (Dm); Friesner 17104 (Bt—61983). Steuben Co.: C. C. Deam 20885 (Dm), 58416 (H—43335, N). Sullivan Co.: C. C. Deam 18226 (Dm). Tippecanoe Co.: Ek s.n. [10-1-1942] (Bt—64007). Tipton Co.: C. C. Deam 13621 (Dm). Union Co.: C. C. Deam 47283 (Dm), 58171 (N). Wabash Co.: Friesner 16015 (Bt—53182). Warren Co.: C. C. Deam 49625 (Dm). Wayne Co.: "M. B." 155 (Ea); Creek 158 (Ea); Frenning 3 (Ea); Hudson 165 (Ea); L. J. King 1587 (Ea), 1762 (Ea), 2571 (Ea); Knipe s.n. (In—2514). Wells Co.: C. C. Deam s.n. [Sept. 13, 1896] (Dm). White Co.: C. C. Deam 58210 (N). County undetermined: Friesner 15826 (Kr). IOWA: Adair Co.: A. R. Moldenke 936 (Lw). Allamakee Co.: Tolstead s.n. [July 20, 1933] (Ca—882838), s.n. [July 25, 1933] (Io—144283). Boone Co.: Macklin & Pammel s.n. [Aug. 1912] (Io—52727); Pammel & Henning s.n. [Aug. 31, 1930] (St—9272). Cedar Co.: Fay 1368 (Vi). Clayton Co.: Melhus & Dietz s.n. [McGregor, Aug. 1933] (Io—141093); A. R. Moldenke 990 (Lw); L. H. Pammel s. n. [St. Olaf, Aug. 10, 1924] (Io—115804). Decatur Co.: J. P. Anderson s.n. [July 13, 1903] (Io—52110). Delaware Co.: Bode s.n. [Aug. 1919] (Io—99818). Des Moines Co.: L. H. Pammel 737 (Io—118880), 960, in part (Io—119554), s.n. [Crapo Park, Sept. 8, 1930] (Io—136311). Emmet Co.: Cratty s.n. [1883] (Ob—50843), s.n. [Armstrong, June 24, 1897] (Io—15335). Fayette Co.: Fink 264 [Aug. 1, 1894] (W—214890), 264 [Aug. 29, 1894] (W—214890), s.n. [August 1, 1894] (Io—31576). Fremont Co.: L. H. Pammel 732 (Io—119321). Hamilton Co.: L. H. Pammel s.n. [Stratford, 8-1-1913] (Io—77202). Hardin Co.: Pammel & Hagge s.n. [Eldora, Oct.

13, 1928] (Io--134449). Henry Co.: Boley 688 (Se--31487). Iowa Co.: A. R. Moldenke 976 (Lw). Johnson Co.: P. Barker s.n. [Iowa City, 7-27-29] (Au); Huang 2466 (Lb--54992). Jones Co.: L. H. Pammel s.n. [Oxford Junction, July 25, 1919] (Io--97272). Lee Co.: Fults 1500 (Io--138821). Linn Co.: A. R. Moldenke 982 (Lw). Louisa Co.: L. H. Pammel s.n. [Fredonia, June 1927] (Io--129477), s.n. [Fredonia, Aug. 1927] (St--9280). Madison Co.: A. R. Moldenke 939 (Lw). Mahaska Co.: Augustine 412 (Ok, Ok); A. R. Moldenke 959 (Lw). Marion Co.: A. R. Moldenke 955 (Lw). Mills Co.: A. R. Moldenke 920 (Lw). Mitchell Co.: Tittle 31 (Io--74179). Muscatine Co.: Pammel, Kelso, & Harlan s.n. [Jul. 20, 1919] (Io--95043). Palo Alto Co.: L. H. Pammel s.n. [Lost Island Lake, Jul. 15, 1920] (Io--98810). Polk Co.: L. H. Pammel 4142 (Io--32536); Pammel & Forbes s.n. [Bloomfield, Jul. 25, '27] (Io--129942); Pammel, Frankel, & Rieman 986 (Io--119680). Pottawattomie Co.: O. M. Clark 6080 (B); A. R. Moldenke 931 (Lw). Poweshiek Co.: M. E. Jones s. n. [Grinnell, August 1875] (Du--151781); A. R. Moldenke 964 (Lw). Scott Co.: Suksdorf s.n. [June 29, 1874] (Pl--138358), s.n. [July 28, 1874] (Pl--138358). Story Co.: Botanical Seminar 7 (Io--81132); W. P. Caldwell 18 (Au--122794); J. R. Campbell 67 (Io--50252); P. Clayton 147 (Io--84562); Cratty s.n. [Ames, Jul. 1925] (Io--117327); A. S. Hitchcock s.n. [Ames, 1889] (Io--15334); Jeffs s.n. [Ames, July 4, 1907] (Ok--10369); Pammel & Ball s.n. [Ames, Aug. 21, 1897] (Io--15333). Tama Co.: Fisk s.n. [Jul. 1926] (Io--126759). Union Co.: T. L. Andrews s.n. [Creston] (Io--22924). Wapello Co.: Cratty s.n. [Ottumwa, Jul. 15, 1927] (Io--129751). Warren Co.: A. R. Moldenke 945 (Lw); L. H. Pammel s.n. [Norwalk, Sept. 9, '27] (Io--130062). Webster Co.: Blumer 4441 (Io--107739); Paige s.n. [Fort Dodge] (Io--131045). Woodbury Co.: L. H. Pammel s.n. [Sioux City, July 7, 1919] (Io--97278). County undetermined: Somes 3488 [Butler's Landing] (W--672271). KENTUCKY: Breckinridge Co.: R. Runyon 1260 (W--1438382). Edmonson Co.: Lix 478 (N). Fayette Co.: F. T. McFarland s.n. [Lexington, Sep. 30, 1915] (Ky--1780). Harlan Co.: F. E. Lloyd s.n. [July 25, 1888] (Cm). Henderson Co.: A. R. Moldenke 105 (Fg). Hopkins Co.: A. R. Moldenke 108 (Fg). Jessamine Co.: F. T. McFarland 92 (Ky, S, Vi). Madison Co.: Wharton 835 (N). Nelson Co.: Agnes s.n. [July 4, 1933] (I). Scott Co.: Singer 308 (W--1465820). Union Co.: Shacklette 504 (Ky). Webster Co.: A. R. Moldenke 106 (Fg). TENNESSEE: Davidson Co.: Ainslie s.n. [Nashville, July 2, 1914] (Ka--66476); Gattinger s.n. [about Nashville] (Du--91132). Hamilton Co.: Moldenke & Woods 501 (S). Henry Co.: A. R. Moldenke 111 (Fg). Jackson Co.: A. R. Moldenke 56 [H. N. Moldenke 21781] (Bm). Knox Co.: Ruth 788 (N). Lewis Co.: C. B. King 176 (Au). Marion Co.: A. R. Moldenke 775 (S).

McMinn Co.: A. R. Moldenke 778 (B, S); Moldenke & Woods 500 (S). Monroe Co.: A. R. Moldenke 779 (B, S). Montgomery Co.: T. L. Andrews 146 (Io--83617). Obion Co.: Jennings & Jennings s.n. [Reelfoot Lake, 1924] (Cm, Cm, Cm). Sevier Co.: A. R. Moldenke 54 [H. N. Moldenke 21778] (Bm). Shelby Co.: Demaree 33199 (Sm). Tipton Co.: Byars s.n. [Covington, Aug. 14, 1898] (W--330912). Wayne Co.: McDougall 1060 (W--1925243). County undetermined: W. H. Camp 1806 [Smoky Mts. Nat. Park] (N), 1807 [Smoky Mts. Nat. Park] (N). MICHIGAN: Allegan Co.: C. H. Kauffman s.n. [New Richmond, Aug. 11, 1910] (Mi). Berrien Co.: Billington s.n. [July 29, 1919] (Mi). Gratiot Co.: C. A. Davis s.n. [Alma, Aug. 8, '89] (Mi, Mi), s.n. [July 29, '92] (Pl--22604). Ingham Co.: L. H. Bailey s.n. [Lansing, Aug. 4, 1885] (Ba); Collector undesignated s.n. [Lansing, 8/15/1867] (Lb--27623); E. B. Lake s.n. [8-7-88] (Or--8874); Yuncker 529 (Or--13548, Ur). Ionia Co.: C. F. Wheeler s.n. [Hubbardston] (Mi). Isabella Co.: A. R. Moldenke 1032 (Lw, Ut). Kent Co.: H. M. Bailey s.n. [Grand Rapids, July 29, 1892] (Mi, Mi); Daniels s.n. [Alto, June 1899] (Lb--27622). Livingston Co.: Hamerstrom 197 (Mi). Menominee Co.: Grassl 2702 (N). Montcalm Co.: A. R. Moldenke 1034 (Lw). Ontonagon Co.: E. G. Voss 7769 (Mi). Saint Clair Co.: C. K. Dodge s.n. [8-28-92] (Mi), s.n. [Aug. 15, 1910] (Mi). Washtenaw Co.: E. C. Almendinger s.n. [Ann Arbor, July 18, 1860] (Mi); K. C. Davis 108 (Pl--22572); Harrington s.n. [Ann Arbor, July 1870] (Mi); N. A. Harvey s.n. [Ypsi, Aug. 16, 1916] (Mi); F. J. Hermann 9104 (N); C. D. La Rue s.n. [Aug. 6, 1915] (Mi), s.n. [Aug. 7, 1915] (Mi); C. L. Lundell 8315 (Ld); Whited 2108 (Or--12381). Wayne Co.: Farwell 1289 (C); Foote s.n. [Detroit, July 10, 1870] (Mi); H. H. Rusby s.n. [Detroit, Aug. 1884] (Bz--23791, Bz--23792, Mi, Se--14946). WISCONSIN: Bayfield Co.: Shaughnessy & Shaughnessy s.n. [Oct. 3, 1959] (Ws, Ws); Weber, Ugent, & Zimmerman s.n. [September 3, 1959] (Ws). Buffalo Co.: H. H. Smith 7180 (B). Columbia Co.: Botany 162 class s.n. [Sept. 28, 1935] (Ws); Fernholz s.n. [Aug. 15, 1930] (Ws); Koeppen 131 (Ws); H. L. Russell s.n. [Poynette, Aug. 20, '86] (Ws). Crawford Co.: Fassett 9791 (Um--186, Ws); A. R. Moldenke 994 (Lw); H. H. Smith 7520 (B); C. Wilson s.n. [Sept. 18, 1960] (Ws). Dane Co.: C. C. Albers 33011 (Au), 33012 (Au); W. H. Chase s.n. [8/10/1877] (Ws); T. J. Hale s.n. [Madison] (Ws); Hale & McCabe s.n. [27 July 1945] (Ws); Heddle 2T266 (Ws); A. R. Moldenke 1011 (Lw, Ut); R. C. Monroe s.n. [October 10, 1959] (Ws); Rickett s.n. [Madison, August 1, 1926] (Lb--27621); A. B. Seymour 1061 (H--107711, Ws); Stroesenreuther s.n. [Oct. 5, 1959] (Ws). Dodge Co.: A. R. Moldenke 1013 (Lw). Dunn Co.: Goessel 8956 (B); Weinzirl s.n. [Aug. 7, '92] (Ws). Grant Co.: Blazkovec s.n. [June

29, 1959] (Ws); Fassett 12528 (Ws); Iltis, Long, & Rudolph 13793 (Ws); Iltis & Salamun 10058 (Ws, Ws); A. R. Moldenke 998 (Lw); L. H. Pammel 1053 (Io—119695); Pammel & Johnson s.n. [Muscoda, Aug. 17, 1928] (Io—134359, St--9273); H. H. Smith 7681 (B, Ws); Wunderlin s.n. [Aug. 14, 1960] (Ws). Green Co.: E. E. Chambers 27 (Ws), 39 (Ws). Green Lake Co.: Kunz s.n. [Aug. 25, 1929] (Ws). Iowa Co.: A. R. Moldenke 1002 (Lw, Ut). Juneau Co.: Bramschreiber s.n. [July 15, 1959] (Ws). LaCrosse Co.: Hartley 1623 (Ws); A. M. Peterson 562 (Ws). Lafayette Co.: Arnot s.n. [July 26, 1956] (Ws); Iltis 9561 (Ws); Shinners 2357 (N, Ws). Milwaukee Co.: J. S. Douglas s.n. (Je--3165); Ramaley 344 (Bl--42343); Shinners 1479 (Ws); Strong s.n. [Wauwatosa, July 28, 1891] (Mi). Pierce Co.: Fassett 5631 (Ws). Richland Co.: Iltis & Salamun 9942 (Ws); Wills s.n. [Sept. 25, 1957] (Ws), s.n. [July 27, 1959] (Ws). Rock Co.: E. W. Fell 57-802 (Ws); Skavlem s.n. [Jonesville, July 23, '89] (Ws); J. Wickham 15 (Ws). Vernon Co.: Fassett 20235 (Ws); Pammel & King s.n. [Portland, 8-26-'01] (Io--32602); H. H. Smith 7258 (B, Ws). Walworth Co.: Almon s.n. [July 23, 1926] (Um--204); N. Hollister 137 (Um--196); Kleeberger s.n. [Whitewater, 8-1-1877] (Gg--31437). Waukesha Co.: Cull 236 (Ws); Schulte s.n. [Sept. 1959] (Ws). Waupaca Co.: L. Hansen s.n. [Sept. 26, '60] (Ws); Rill s.n. [July 16, 1959] (Ws). MINNESOTA: Hennepin Co.: F. H. Burglehaus 8467 (Se—14947); E. T. Harper III (Pl—66548); J. H. Sandberg s.n. [July 1890] (Ms). Rice Co.: Goldsmith 119 (N). NORTH DAKOTA: Stutsman Co.: Lunell 869 (Ur). SOUTH DAKOTA: Day Co.: J. F. Brenckle s.n. [July 22, 1938] (B). Minnehaha Co.: P. Johnson 33 (Se--77271). KANSAS: Anderson Co.: A. S. Hitchcock s.n. [Anderson Co., July 1896] (Ka); R. L. McGregor 13169 (Lw). Atchison Co.: A. S. Hitchcock s.n. [Atchison Co., Oct. 1896] (Ka); Horr & McGregor E.531 (Au--122795, B, Ca--44813, No--15591, Ok, Rf, S, St, Tl, Vi, W--2031362), s.n. [10/4/47] (Lw); Jeanette 165 (N); A. R. Moldenke 909 (Lw). Barber Co.: Kellerman s.n. [Medicine Lodge, July 15, 1888] (Ka); R. L. McGregor 14580 (Lw), 14717 (Lw). Barton Co.: A. S. Hitchcock s.n. [Barton Co., August 1895] (Ka). Bourbon Co.: Kellerman s.n. [Fort Scott, July 15, 1887] (Ka); Z. D. Thompson 50 (Lw). Brown Co.: Clothier & Whitford s.n. [July 29, 1897] (Ka); F. Garner s.n. [Aug. 1925] (Ka--72014, Lb--27626); R. L. McGregor 17048 (Lw); A. R. Moldenke 914 (Lw). Butler Co.: A. S. Hitchcock s.n. [White Water, July 1892] (Ka). Chase Co.: A. S. Hitchcock s.n. [Chase Co., August 1895] (Ka). Chautauqua Co.: A. S. Hitchcock s.n. [Chautauqua Co., Aug. 8, 1896] (Ka); W. H. Horr s.n. [July 5, 1930] (Lw). Cherokee Co.: A. S. Hitchcock s.n. [Cherokee Co., May 1896] (Ka); A. A. Jacobs 21 (Ka--74034), 50 (N), 106 (Ka--74090); E. W. Lathrop 2758 (Lw); R. L. McGregor 15780 (Lw). Cloud Co.:

Carleton s.n. [July 12, 1888] (Ka); S. V. Fraser 438 (Ka--78941); A. S. Hitchcock s.n. [Concordia, June 17, 1897] (Ka). Coffey Co.: Wimpey s.n. [Burlington, July 1896] (Ka). Cowley Co.: Clothier & Whitford s.n. [Aug. 22, 1897] (Ka); A. R. Moldenke 885 (Lw); Rydberg & Imler 482 (Lw, N). Crawford Co.: Clothier & Whitford s.n. [Aug. 12, 1897] (Ka). Dickinson Co.: A. S. Hitchcock s.n. [Dickinson Co., June 1896] (Ka). Doniphan Co.: Clothier & Whitford s.n. [July 31, 1897] (Ka); F. C. Gates 20889 (Ka--89686); R. L. McGregor 15990 (Hi--195443, Lw); F. Schultz s.n. [Wathena, Oct. 4, 1925] (Ka--73704). Douglas Co.: Horr & McGregor E.531 (Ur); Kellerman s.n. [Lawrence, July 20, 1887] (Ka); R. L. McGregor 182 (Lw); J. D. Poindexter 9 (Lw). Elk Co.: Clothier & Whitford s.n. [Aug. 20 & 21, 1897] (Ka). Franklin Co.: Hetzer 419 (Lw); A. S. Hitchcock s.n. [Franklin Co., July 1896] (Ka). Geary Co.: F. C. Gates 18768 (Ka--87795); A. S. Hitchcock s.n. [Geary Co., June 1896] (Ka). Graham Co.: A. S. Hitchcock s.n. [Graham Co., June 20, 1897] (Ka). Greenwood Co.: A. S. Hitchcock s.n. [Eureka, July 1892] (Ka); W. H. Horr s.n. [June 28, 1930] (Lw); R. L. McGregor 11699 (Lw). Jackson Co.: Clothier & Whitford s.n. [July 28, 1897] (Ka). Jefferson Co.: Clothier s.n. [Perry, Oct. 12, 1896] (Ka); G. Latham 651 (Lw). Johnson Co.: A. S. Hitchcock s.n. [Olathe, Aug. 1892] (Ka). Kiowa Co.: A. S. Hitchcock s.n. [Kiowa Co., Aug. 1896] (Ka). Labette Co.: A. S. Hitchcock s.n. [Labette Co., Aug. 1896] (Ka); R. L. McGregor 16996 (Lw); B. L. Wagenknecht 1889 (Lw, Lw). Leavenworth Co.: A. S. Hitchcock s.n. [Leavenworth Co., May 1896] (Ka); R. L. McGregor 840 (Lw). Linn Co.: Kellerman s.n. [Mound City, July 18, 1887] (Ka); A. R. Moldenke 869 (Lw). Lyon Co.: R. L. McGregor 1894 (Lw). Marshall Co.: A. S. Hitchcock s.n. [Marshall Co., Dec. 10, 1896] (Ka); W. H. Horr 4582 (Lw). McPherson Co.: A. S. Hitchcock s.n. [McPherson, July 1892] (Ka). Miami Co.: A. S. Hitchcock s.n. [Paola, Aug. 1892] (Ka). Mitchell Co.: A. S. Hitchcock s.n. [Beloit, June 18, 1897] (Ka). Montgomery Co.: A. S. Hitchcock s.n. [Montgomery Co., Aug. 1896] (Ka); Rydberg & Imler 432 (Ka--74584, Lw). Morris Co.: A. S. Hitchcock s.n. [Morris Co., Aug. 1895] (Ka); J. B. S. Norton s.n. [July 30, 1895] (Ka). Nemaha Co.: A. S. Hitchcock s.n. [Nemaha Co., Dec. 11, 1896] (Ka). Neosho Co.: A. S. Hitchcock s.n. [Neosho Co., Aug. 1896] (Ka); W. H. Horr 6729 (Lw); E. L. Richards 3176 (Lw). Osage Co.: Z. D. E. Brown s.n. [July 28, 1896] (Ka); B. L. Wagenknecht 3969 (Lw), 4086 (Lw). Osborne Co.: Neher 348 (Ka--79934). Ottawa Co.: A. S. Hitchcock s.n. [Ottawa Co., July 1895] (Ka); A. R. Moldenke 901 (Lw). Philipps Co.: A. S. Hitchcock s.n. [Philipps Co., June 29, 1897] (Ka). Pottawatomie Co.: D. L. Marsh 1692 (Lw); Pond s.

n. [July 24, 1896] (Ka); B. L. Wagenknecht 3256 (Lw). Republic Co.: G. E. Morley 466 (Lw), 810 (Lw); F. A. Smith s.n. [July 1896] (Ka). Riley Co.: Carleton s.n. [Aug. 2, '92] (C); F. C. Gates 12775 (Lb--27627, Um--185); J. B. S. Norton 389 (Ka, N, W--353116); Waugh s.n. [Aug. 16, 1892] (Ka). Saline Co.: Hancin 429 (Ka--76786); J. B. S. Norton s.n. [Saline Co., September 1895] (Ka). Sedgwick Co.: T. L. Andrews s.n. [Whichita] (Io--28226); Herb. Wichita Univ. 168 (Lw). Shawnee Co.: Maus 842 (Ka--72351); Norton & Clothier s.n. [July 4, 1895] (Ka); Volle 327 (Lw). Smith Co.: A. S. Hitchcock s.n. [Smith Co., June 28, 1897] (Ka). Sumner Co.: A. S. Hitchcock s.n. [Wellington, July 1892] (Ka). Wabaunsee Co.: J. B. S. Norton s.n. [Maple Hill, July 4, 1894] (Ka). Washington Co.: Clothier & Whitford s.n. [July 24, 1897] (Ka); Dodd 137 (Ka--80570); W. H. Horr 4655 (Lw). Wilson Co.: Haller s.n. [Roper, June 16, 1896] (Ka). Woodson Co.: Clothier & Whitford s.n. [Aug. 29, 1897] (Ka); W. H. Horr s.n. [July 10, 1930] (Lw); Horr & McGregor s.n. [July 17, 1947] (Lw); E. W. Lathrop 1304 (N), 1346a (Lw); Mrs. O. E. Rogers s.n. [Yates Center, July 11, 1928] (Ka--76503). Wyandotte Co.: K. K. Mackenzie s.n. [Rosedale, July 12, 1896] (Ka, N); E. L. Richards 3289 (Lw). MISSOURI: Bates Co.: A. R. Moldenke 868 (Lw). Boone Co.: Daniels s.n. [July 1903] (Lb--4180, Lb--4181); D. B. Dunn 13974 (Lb--49681); Favor s.n. [Aug. 29, 1901] (Lb--4179); L. Jeffrey 108 (Lb--30365, Lb--30372); Rickett s.n. [Sept. 1926] (Lb--7093), s.n. [Hermit Hill, July 16, 1927] (Lb--7092). Camden Co.: A. R. Moldenke 857 (Lw). Clay Co.: Brouillette s.n. [Liberty, 7/23/1927] (Je--3161); B. F. Bush 12694d (Lb--14165); Gier 8129 (S). Franklin Co.: A. R. Moldenke 846 (Lw). Greene Co.: Blankinship s.n. [Willard, July 9, 1919] (Po--63847); P. C. Standley 8278a (W--687240). Grundy Co.: Crookshanks 141 (Lb--29612). Henry Co.: H. N. Moldenke 21922 (Lw). Hickory Co.: A. R. Moldenke 859 (Lw). Jackson Co.: Erisman s.n. [Kansas City, July 27, '94] (Ah); K. K. Mackenzie 577 (We), s.n. [July 19, 1896] (N). Jefferson Co.: Favor 588 (Lb--4178). Lincoln Co.: A. R. Moldenke 841 (Lw). Maries Co.: H. N. Moldenke 21918 (Lw). Marion Co.: J. Davis 4592 (Ur). Mc Donald Co.: E. J. Palmer 4229 (W--1569310). Miller Co.: A. R. Moldenke 854 (Lw). Nodaway Co.: J. R. Singleton 154 (Lb--34597). Pemiscot Co.: Dinwith 477 (Lb--4177). Phelps Co.: A. R. Moldenke 850 (Lw). Pike Co.: J. Davis 950 (N); A. R. Moldenke 839 (Lw, Ut). Platte Co.: Radloff s.n. [July 5, 1956] (Ur). Saint Louis Co.: Collector undesignated s.n. [Aug. 1893] (S); Eggert 1949 (Lb--4176); C. Epling 6816 (La); A. R. Moldenke 69 [H. N. Moldenke 21799] (Mi); H. N. Moldenke 21800 (Mi). Shelby Co.: Ripley s.n. [Sep. 10, 1902] (Je--3162, Je--3163). Warren Co.: A. R. Moldenke

843 (Lw). Saint Louis: C. F. Baker s.n. [St. Louis, Sept. '99] (Po--64518); Eggert s.n. [St. Louis, Aug. 1875] (Au, Ca--183210, Cm, Io--79866, Mn--6897, N, W--754956); Engelmann s.n. [St. Louis, Sept. 1838] (Dt), s.n. [St. Louis, Sept. 1841] (W--71969), s.n. [St. Louis] (Br); M. Martens s.n. [St. Louis] (Br); Riehl 135 (Br, M). County undetermined: Engelmann s.n. [July 1839] (Br); Spillman 298 (Pl--22608). ARKANSAS: Arkansas Co.: Demaree 14218 (Sm). Ashley Co.: Demaree 23898 (Sm). Baxter Co.: Demaree 23602 (Sm). Benton Co.: Heacox s.n. [July 20, '89] (Ob--50844). Bradley Co.: Demaree 20689 (Sm), 23865 (Sm), 24845 (Sm). Clay Co.: Demaree 26997 (Au--122803, N). Craighead Co.: Demaree 25777 (N), 29241 (Le). Cross Co.: Demaree 19633 (Lb--46744, N, Sm). Drew Co.: Demaree 13601 (Sm, Tl), 17620 (Du--256560, Gg--267614, N, Ok), 17897 [Herb. Drushel 11619] (N, Ok, Ur), 17907 (N, Ok), 24462a, in part (Bm, Sm), 24517 (Sm), 24748 (Sm). Faulkner Co.: Welch 1292 (Dp). Franklin Co.: J. M. Mason s.n. [Meramec State Park, 8/16/37] (Lb--34373). Fulton Co.: Demaree 26391 (N), 26826 (Au--122816, N); Zirkle & Drouet s.n. [Aug. 19, 1928] (Lb--27624, Lb--27625). Garland Co.: Demaree 20470 (Lb--53416, N, Sm); R. Runyon 1487 (W--1568007). Green Co.: Demaree 27097 (Au--112817, N). Hempstead Co.: Demaree 21480 (Hi--170691, N, Sm), 46061 (S). Hot Spring Co.: Demaree 15563 (N), 15609 (Io--152223, Ok), 16520 (Io--152211, Ok, Or--43132, Ur), 17460 (N), 17887 (Bt--52479, Io-152221, Ky, Ok, Ok, Pl--131515, Ur), 18887 (N), 19321 (Sm). Johnson Co.: Demaree 19993 (N, Sm), 20282 (N, Sm). Lawrence Co.: Demaree 30987 (Sm); Rolfs s.n. [8/91] (Io--4489). Lee Co.: Demaree 37358 (Sm). Logan Co.: Pyle 831 (De). Lonoke Co.: Demaree 48818 (Lw). Marion Co.: Demaree 20629 (N, Sm), 45947 (S). Miller Co.: Demaree 44898 (Ca). Montgomery Co.: Demaree 46623 (S). Nevada Co.: M. P. Hollister 110 (W--587798). Ouachita Co.: Demaree 46033 (S). Phillips Co.: Demaree 37358 (Sm), 37402 (Sm, Z). Pope Co.: Demaree 19886 (Lb--53417, N, N, Sm). Prairie Co.: Demaree 15527 (N). Pulaski Co.: Demaree 8193 (Bt--10318, Ca--71741, Dm, Du--233624, N, W--1581641), 8632 (W--1580200). Randolph Co.: Demaree 23906 (Bm, Lb--47030, Sm). Sebastian Co.: Bigelow s.n. [Fort Smith] (W--71976). Sharp Co.: Demaree 26273 (N). Stone Co.: Demaree 27872 (N). Yell Co.: Demaree 20121 (N), 25121 (Sm). LOUISIANA: Bossier Par.: Correll & Correll 10057 (H--78636, N); Penn s.n. [Oct. 29, 1941] (Tl). East Baton Rouge Par.: L. H. Bailey s.n. [Baton Rouge, July 16, 1918] (Ba). Lincoln Par.: Cocks s.n. [July 7, 1901] (Tl). Livingston Par.: Correll & Correll 9129 (H--78594). Natchitoches Par.: Biology Class 302 no. 2169 [L. E. Fox 2169] (Nc); E. J. Palmer 8000 (Gg--182150). Or-

leans Par.: Cocks s.n. [June 1900] (Tl); T. Drummond s.n. [in vicin. New Orleans, 1832] (Lu). Plaquemines Par.: Langlois 611 (N), s.n. [June 1882] (I). Rapides Par.: C. R. Ball 556 (N, W--382828). Saint Landry Par.: Ewan 19328 (Tl). Saint Martin Par.: Correll & Correll 9406 (H--78593). Saint Tammany Par.: Arsène 11083 (W--1031492), 11391 (W--1031496), 12069 (W--1031916). Parish undetermined: Jos. Hale 241 (T); Herb. Hapeman s.n. (Hp); Riddell 1261 (N). NEBRASKA: Adams Co.: H. Hapeman s.n. [Aug. 5, '92] (Hp); R. de Lima 824 (I). Cass Co.: T. A. Williams 13 (W--71975). Cherry Co.: Tolstead 4-706 (Io--145167). Custer Co.: J. M. Bates 1962 (Io--35178). Douglas Co.: Kleeberger s.n. [Omaha] (Og--31438). Jefferson Co.: Rohrbaugh 167 (Ok). Kearney Co.: Hapeman s.n. [Minden, Aug. 29, 1931] (Au). Nemaha Co.: A. R. Moldenke 923 (Lw, Ut); Shubert s.n. [July 10, 1933] (Ob--50847). Otoe Co.: A. E. Allen s.n. [Talmage, July 16, 1891] (Je--3164); C. J. Elmore s.n. [Talmage, July 6, 1891] (Je--3166). Platte Co.: Clevenger s.n. [Columbus, July 11, 1904] (La). Seward Co.: Kiener 17088 (Ca--36917). County undetermined: Herb. Univ. Nebraska 436 (Au). OKLAHOMA: Atoka Co.: Cory 56795 (St). Bryan Co.: W. S. Blain s.n. [Durant, June 28, 1935] (Bt--29691). Caddo Co.: Edw. Palmer 244 (T, W--71955). Carter Co.: M. Hopkins 6366 (Ok). Cherokee Co.: C. S. Wallis 657 (St), 3396 (St). Choctaw Co.: H. W. Houghton 4032 (N). Cleveland Co.: R. E. Berry 58 (Ok--10347); Bruner s.n. [8/20/24] (Io--117043, Ok--10343); Collector undesignated 227 (Ok--10322); C. T. Eskew 2001 (Ok); M. Hopkins 1094 (Ok), 4610 (Ok); Jeffs s.n. [6/22/1922] (Ok--10339); Personett 96 (Ok--10344). Comanche Co.: M. K. Clemens 11749 (Ba), 11749a (Gg--37143). Custer Co.: Waterfall 2974 (Ok). Delaware Co.: Blevins 63 (St--18581); C. S. Wallis 2438 (St). Garfield Co.: Gephardt 655 (W--2421182). Johnston Co.: G. J. Goodman 6325 (Ok); G. T. Robbins 3163 (Ca--966041, N, Ok). Kay Co.: Byler 190 (St); G. W. Stevens 1821 (Ok, St--9274). Latimer Co.: O. M. Clark s.n. [Red Oak, 6/13/30] (Ok--10341). Major Co.: G. W. Stevens 1742 (Ok). Marshall Co.: G. J. Goodman 5903 (Ca--81888, Ok, St). Mayes Co.: C. S. Wallis 2471 (St), 5233 (St). McCurtain Co.: Hixson 100 (St--13227); Ivy 25:1 (St--20371); Waterfall 12412 (Ca--72112, St, W--2231160). Murray Co.: Hopkins & Demaree 58 (Ba, Ok, St--12768); G. M. Murrill 716 (N, Rf); Stratton 4728 (N, St--26137, St--26138). Muskogee Co.: E. L. Little 189 (Ok--10340), 1931 (Ok--10342); C. S. Wallis 7719 (Au--170516, St). Oklahoma Co.: Waterfall 2441 (N), 2895 (Ok, St), s.n. [June 24, 1939] (Ok). Payne Co.: R. O. Bain 44 (Pl--124970): Bogue s.n. [July 18, 1896] (Ob--50854); Brensing 35 (Ca--882833); R. M. House 95 (Se--29718); C. D. Learn s.n. [July 14, 1916] (St--9271); Pote 66 (Bt--48282); Stratton 158 (St--26123), 3608 (I);

Walton 143 (Au); Waterfall 123 (St); Waugh s.n. [Stillwater, 1893] (Ka). Pontotoc Co.: D. McCoy 807 (St), 1121 (St), 1725 (Au--122805); G. T. Robbins 3110 (Ca--966040); C. Thomas s.n. [Ada, 4-24-35] (Ok). Sequoyah Co.: C. S. Wallis 7704 (Au--170517, St). Tulsa Co.: M. B. Clark 524 (St); J. R. Willis 3 (Ok). Woods Co.: G. W. Stevens 1673 (Du--66082, N, Ok, Ok, Ok--20714, St--9275, St--9277, Ur, W--589621). Woodward Co.: Engleman 513 (St). County undetermined: Clifton 91 (Ok--10346); Herb. Univ. Okla. 10345 (Ok). TEXAS: Angelina Co.: H. J. Hamby 1472 (Ar--206312). Baylor Co.: Tharp 4501 (Au). Bell Co.: S. E. Wolff 1329 (W--1622400), 3247 (Tr, Tr--16239). Bowie Co.: Tharp 2774 (Au). Brazoria Co.: Tharp 2777 (Au), s.n. [8.21.29] (Au). Camp Co.: Moldenke & Woods 561 (S). Cherokee Co.: Ness s.n. [near Rusk, Aug. 15, 1926] (Tr). Dallas Co.: Boll s.n. [1871] (Cb); C. L. Lundell 11581 (N, Rf), 14022 (N, Rf, Rf); M. B. Stephenson s.n. [vicinity of Dallas, June 20, 1929] (W--1432650). Denton Co.: B. B. Harris s.n. [7-20-27] (Au, Nt, Nt); Whitehouse 16426 (Mi, N). Ellis Co.: O. Sanders 5 (Mi). Gonzales Co.: McCart 158 (Au--122793); Tharp s.n. [Ottine, 7-4-1929] (Au, N), s.n. [Ottine, 7-14-1929] (Mi), s.n. [Ottine marsh, 6-26-39] (Au). Grayson Co.: H. Gentry 51-1786 (Au--122791). Hemphill Co.: C. M. Rowell 5563 (Au--195410). Hunt Co.: Thurow s.n. [Clinton, October 10, 1924] (Hu). Jefferson Co.: G. L. Fisher s.n. [Nome, Sept. 2, 1937] (Ew, Ew, Ew). Lamar Co.: Turner s.n. [Deport, Sept. 1884] (Mi). Milam Co.: S. E. Wolff 4340 (Tr). Montgomery Co.: Warner s.n. [R.R. yard, Conroe] (Hu). Nacogdoches Co.: W. H. Lewis 4999 (Nb). Newton Co.: Tharp s.n. [7-23-39] (Au, Au, Ca--882832, Mi, N). Robertson Co.: Reeves 187 (N). Tarrant Co.: Killian 6933 (Au, W--1465329); Ruth 503 (Cm), 534 (N, Sm, Ur). Trinity Co.: Lewis & Oliver 5304 (Nb); Tharp 2778 (Au, Au). Wise Co.: Whitehouse 16374 (N). Wood Co.: McMullen s.n. [Golden, 6/17/27] (Au), s.n. [9-10-27] (Nt). CULTIVATED: Austria: Halácsy s.n. [h. b. Theresiani, Aug. 1871] (La). Belgium: M. Martens s.n. (Br). England: Linnaeus s.n. [Hort. Cliff. G.834, S.5; Bailey Hort. neg. 6405] (N--photo of type). France: Herb. Harvey s.n. [h.R.P. 1819] (Du--166444), s.n. [h.R.P. 1844] (Du--166441), s.n. [h.R.P.] (Du--155434); Herb. Molliano s.n. [P] (Br); Herb. Schumacher s.n. [h. Paris] (Cp). Germany: Herb. Harvey s.n. [Pottstadt hort. bot. 1810] (Du--166442); R. Schulz s.n. [Berlin, 11.8.1897] (B). Italy: Herb. Harvey s.n. [h.P. 1820] (Du--166443). Maryland: McCann s.n. [9-15-36] (Md). New York: Eggleston & Schneider s.n. [July 18, 1905] (N); R. C. Schneider s.n. [N. Y. Bot. Gard. Cult. Pl. 25417] (N). Pennsylvania: J. M. Greenman 1374 (Du--123485). Spain: Herb. Hort. Hispal. 67 (Q); Herb. Hort. Reg. Matrit. 59 (Q); Pascal 66

(Q). Sweden: Linnaeus s.n. [hort. Ups.] (F--photo, F--photo, N--photo, N--photo, S, S, Sg--photo, Sg--photo, Z--photo, Z--photo); Nietzel s.n. [hort. Ups.] (F--photo, N--photo, S, Sg--photo, Z--photo); Reuterman s.n. [19/9/1888] (Go); Vestergren s.n. [1925.5. VIII] (S). Switzerland: Herb. Hort. Bot. Bern. s.n. [Aug. 1827] (W--264610); Herb. Hort. Bot. Genev. s.n. [Jul. 1828] (W--264609). LOCALITY OF COLLECTION UNDETERMINED: Alstroemer s.n. [Bara] (S); Collector undesignated 63 (Q), 64 (Q); Dascomb s.n. [13.1] (Ob--50852); W. Dearness 83 [Oaklands] (Mg); Disbrow s.n. (Nm); Engelmann s.n. [Amer. bor.] (Br, S); Freed s.n. [Amer. bor.] (S); Gibbes s.n. (N); Herb. Buckley s.n. (T); Herb. Chapman s.n. [New England] (C); Herb. Coll. Pharmacy s.n. (Pa); Herb. Liebmann s.n. [North America] (Cp); Herb. Linnaeus G.35, S.13 (Ls, N--photo, Z--photo); Herb. Martius s.n. (Br); Herb. Mus. Bot. Stockholm 14 [North Am.] (S), s.n. (S); Herb. Saldanha 2767 [U.S.A.; Herb. Mus. Nac. Rio ref. VII] (Ja); L. A. Koehler s.n. [U. S.] (Pa); Linderall s.n. [N. Am.] (S); M. Martens s.n. (Br); N. Y. Bot. Gard. Economic Mus. 5750 (N); Osbeck s.n. (S); Palisot de Beauvois s.n. [Etates Unis, 1819] (Du--166440); Schumacher s.n. [North Am.] (S); J. Torrey s.n. [ex Amer. septentr.] (Bm, S), s.n. [Fl. Bor. Am.] (T); Weigand s.n. [Herb. Krause 32445] (B); A. Wood s.n. [N. Eng.] (Pa). MOUNTED ILLUSTRATIONS AND CLIPPINGS: Perry & Fernald, Rhodora 38: pl. 45, fig. 1--4. 1936 (N); No. 448 (N); fig. 8675 (N).

VERBENA URTICIFOLIA var. INCARNATA (Raf.) Moldenke, Phytologia 7: 259. 1960.

Synonymy: Verbena incarnata Raf., Atl. Journ. 154. 1832.

Bibliography: Raf., Atl. Journ. 154. 1832; Raf., Herb. Raf. 69. 1833; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179. 1895; Perry, Ann. Mo. Bot. Gard. 20: 342 & 355. 1933; E. D. Merr., Ind. Raf. 205 & 295. 1949; Moldenke, Phytologia 7: 259. 1960; Moldenke, Résumé Suppl. 2: 1 & 15 (1960) and 7: 9. 1963; Moldenke, Phytologia 9: 93 (1963) and 11: 338. 1965.

This variety is said to differ from the typical form of the species in having narrower leaves, the spikes not paniculate, and the flowers flesh-color instead of white.

The type of the variety was collected by Samuel Constantine Rafinesque along the Juniata River (this could be in Huntingdon, Mifflin, Juniata, or Perry Counties), Pennsylvania. The original description is "Stem branched; leaves ovate lanceolate serrate rough, flowers in simple slender short spikes....on the Juniata R....one foot high, flowers flesh-colored. Differs from V. urticifolia narrower leaves, spikes not paniculate, nor flowers white." Perry (1933) says "Here again the description is too inadequate for specific identification." Jackson (1895) incorrectly cites the original publication as being on page "153", which it is not.

Without an examination of the type specimen it is not possible to be certain of the status of this plant. Perhaps it is a mere

color variant of V. urticifolia L., and possibly the Shinners 1479, whose flowers are described by the collector as having been "pale bluish-white", and Harris s.n. [June 26, 1933], whose flowers are said to have been "pink" -- both cited by me under typical V. urticifolia -- and F. R. Fosberg 15695, whose flowers are said to have been "pinkish-white" and Eames & Wiegand 12796, with "pink" flowers, cited by me as var. leiocarpa Perry & Fernald, belong to var. incarnata instead. It is also not beyond the realm of possibility that Rafinesque's plant was nothing more nor less than xV. engelmannii Moldenke, but I am inclined to doubt this.

VERBENA URTICIFOLIA var. LEIOCARPA Perry & Fernald in Fernald, Rhodora 38: 441--443, pl. 450, fig. 5--8. 1936.

Synonymy: Verbena urticaefolia var. leiocarpa Perry & Fernald ex Deam, Kriebel, Yuncker, & Friesner, Proc. Ind. Acad. Sci. 51: 127. 1942. Verbena ultricifolia var. leiocarpa Perry & Fernald ex Moldenke, Am. Journ. Bot. 32: 609, sphalm. 1945. Verbena urticaefolia var. leiophylla Fern. & Perry ex Moldenke, Alph. List Invalid Names Suppl. 1: 27, in syn. 1947. Verbena urticaefolia f. leiocarpa Deam, Yuncker, & Friesner, Proc. Ind. Acad. Sci. 60: 87. 1951. Verbena urticifolia leiocarpa Perry & Fernald ex Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209. 1951.

Bibliography: Perry & Fernald in Fernald, Rhodora 38: 441--443, pl. 450, fig. 5—8. 1936; C. C. Deam, Fl. Indiana 795, 796, & 1232, map 1720. 1940; Moldenke, Suppl. List Common Names 24. 1940; Moldenke, Obs. Fl. Watchung Suppl. 1: 1. 1941; Deam, Kriebel, Yuncker, & Friesner, Proc. Ind. Acad. Sci. 51: 127. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 2--4, 6—8, 11, 12, 76, & 102. 1942; Moldenke, Known Geogr. Distrib. Verbenac. Suppl. 1: 1 & 2. 1943; Moldenke, Fl. N. Appal. Exp. Watershed 28 & 56. 1943; Moldenke, Obs. Fl. Warren 27. 1944; Moldenke, Castanea 9: 69 (1944) and 10: 36 & 38. 1945; G. N. Jones, Fl. Ill. [Am. Midl. Nat. Monog. 2:] 215—216. 1945; Moldenke, Bot. Gaz. 106: 158--161. 1945; Moldenke, Am. Journ. Bot. 32: 609. 1945; Moldenke, Phytologia 2: 80, 84, & 117. 1945; Deam, Kriebel, Yuncker, & Friesner, Proc. Ind. Acad. Sci. 54: 95. 1945; Moldenke, Am. Midl. Nat. 35: 377. 1946; Moldenke, Alph. List Cit. 1: 5, 10, 14, 15, 18, 25, 32, 33, 38, 46, 51, 98, 124, 125, 130, 139, 142, 144, 148—151, 159, 160, 175, 177, 182, 184, 197--199, 204--206, 208, 213--215, 234, 239, 244, 248, 253, 262, 265, 267, 270, 271, 278--282, 284, 287, 288, & 291—294. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 27. 1947; Moldenke, Phytologia 2: 326, 329, 382, & 383. 1947; Deam, Yuncker, & Friesner, Proc. Ind. Acad. Sci. 56: 110 (1947) and 58: 95. 1948; Moldenke, Wrightia 1: 224. 1948; Moldenke, Castanea 13: 111, 112, & 121. 1948; Moldenke, Alph. List Cit. 2: 296, 391—394, 396—400, 449, 455, 469, 491—493, 496, 506, 512, 513, 520, 524, 538, 544, 555, 558, 576, 583, 584, 589, 594, 606, 617, 620, & 630 (1948), 3: 653, 667, 668, 684, 698, 721, 743—745, 747, 750, 759, 760, 769, 778, 783, 791—793, 823, 828, 842, 848, 887, 892, 898, 912, 927,

934, 938, 942, 963, & 977 (1949), and 4: 979, 985, 1002--1004, 1095, 1098, 1109, 1112, 1114, 1117--1119, 1122, 1123, 1137, 1174, 1176, 1177, 1179, 1181, 1185, 1189, 1211, 1224, & 1227. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 4--8, 12--18, 20, 24, 165, & 200. 1949; Moldenke, Phytologia 3: 72, 130, & 131 (1949) and 3: 283. 1950; Fernald in A. Gray, Man. Bot., ed. 8, 1210. 1950; Moldenke, List Obs. Fl. Watchung Suppl. 2, re-issue: 46. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2213. 1951; Deam, Yuncker, & Friesner, Proc. Ind. Acad. Sci. 60: 87. 1951; Moldenke, Phytologia 3: 450 (1951) and 4: 66--68. 1952; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 129 & 130. 1952; Deam, Yuncker, & Friesner, Proc. Ind. Acad. Sci. 61: 75. 1952; Moldenke, Phytologia 4: 185. 1953; Moldenke, Notes Pl. 2: 46. 1957; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 2, 3: 129 & 130. 1958; Strausbaugh & Core, Fl. W. Va. 3: 774. 1958; Moldenke, Résumé 6--11, 15--21, 23, 25, 26, 30, 225, 337, 428, & 474. 1959; Moldenke, Résumé Suppl. 1: 1--3 & 23 (1959), 2: 2 & 13 (1960), 3: 2--4, 7, 36, & 41 (1962), 4: 1--3 (1962), 5: 1 (1962), and 6: 1, 2, & 9. 1963; Steyerm., Fl. Mo. 1258. 1963; Moldenke, Phytologia 8: 487 (1963), 9: 215 (1963), 10: 101, 106, & 109 (1964), and 11: 55 & 128. 1964; Moldenke, Résumé Suppl. 8: 1 & 6 (1964) and 11: 1. 1964; Moldenke, Phytologia 11: 338, 341, 342, & 346. 1965.

Illustrations: Perry & Fernald in Fernald, Rhodora 38: pl. 450, fig. 5--8 [by E. C. Ogden]. 1936; Moldenke in Gleason, New Britton & Br. Illustr. Fl., print. 1, 3: 130 (1952) and print. 2, 3: 130. 1958.

This variety differs from the typical form of the species in having its leaves densely and uniformly puberulent, short-pubescent, or velutinous beneath, the hairs to 0.3 mm. long, spread over the entire surface, the mature inflorescence-branches usually filiform, loosely ascending or divergent, puberulent, the mature calyx to 2 mm. long, puberulent, the bractlets 0.5--1 mm. long, and the cocci 1.5 mm. long.

The type of the variety was collected by Merritt Lyndon Fernald, Bayard Henry Long, and John Milton Fogg, Jr. (no. 5013) in rich woods at Virginia Beach, Virginia, on September 10, 1935, and is deposited in the Gray Herbarium of Harvard University. In the original publication the following specimens are also cited: CONNECTICUT: Hartford Co.: C. Wright s.n. [Wethersfield] (G). NEW JERSEY: Union Co.: Long s.n. [Port Elizabeth] (G). VIRGINIA: Isle of Wight Co.: Fernald, Griscom, & Long 6674 (G). Southampton Co.: Fernald & Long 6864 (G). Sussex Co.: Fernald, Griscom, & Long 6673 (G). NORTH CAROLINA: Durham Co.: Blomquist 149 (G). SOUTH CAROLINA: Williamsburg Co.: Wiegand & Manning 2714 (G).

Fernald (1936) says: "Common and wide-spreading typical Verbena urticifolia has the leaves strigose-hirsute on the veins beneath.... with stiff hairs up to 1--1.3 mm. long, or glabrate; the mature inflorescence.....with usually stiffly ascending strigose branches; mature calyx.....strigose, 2--2.3 mm. long, the subtending bract 1--

1.5 mm. long; mature nutlets.....about 2 mm. long and definitely corrugated or ribbed on the back. Var. leiocarpa, on the other hand, has the thin leaves.....velutinous or subvelutinous beneath with minute hairs only very rarely 0.3 mm. long; the panicle..... lax, with loosely ascending to divergent puberulent, filiform mature branches; the mature calyx....at most 2 mm. long and puberulent, with very short (0.5--1 mm. long) bract; and the tiny nutlets.....only 1.5 mm. long and quite smooth on the back. Although an old and undated sheet from Connecticut is in the Gray Herbarium, no other material is found there or in the extensive local collection of the New England Botanical Club from north of New Jersey.

"Verbena urticifolia var. leiocarpa, although having the same general lax habit as *V. scabra Vahl, collected by Fernald & Long in SURRY COUNTY, October, 1936 (border of tidal marsh along Gray's Creek, near Cross Creek Landing, south of Swann Point, no. 6863, the first collection from north of Wilmington, North Carolina), may be readily distinguished in flower by the bilobed character of the stigma, the stigmatic surface being subtended by one sterile lobe. In V. scabra, on the other hand, the stigmatic surface lies between two almost equal sterile lobes. The fruiting calyx of V. urticifolia, var. leiocarpa is only slightly divergent from the rachis and the nutlets are smooth; whereas, in V. scabra the fruiting calyx is strongly divergent and the nutlets reticulate above. Furthermore, after drying, the plants in question are easily separable on foliar character, the upper surface of the leaves of V. urticifolia, var. leiocarpa being much less harsh to the touch than those of V. scabra."

The variety is native to the eastern and central United States, occurring with the typical form from Connecticut, southern New York, Pennsylvania, and Ohio west to the Dakotas and south to Florida and Texas. It is described by collectors as being erect, 3--5 feet tall, branching, with fibrous roots, and white flowers. Common names recorded for it are "nettle-leaved vervain", "short-hair white vervain", "white vervain", and "white vervian".

It has been collected in open or waste places, dry waste places, ditches and wet ditches, bogs and boggy depressions, marshes, thickets and fencerows, fields, old or dry fields, wet sloughs, low pastures and pasture land, wooded and small wooded ravines, woods, rich or alluvial woods, dry or moist woods, dense or open woods, low woods and dry shaley woods along the banks of creeks, in moist hollows or clearings in woods, beds of drained ponds, in mixed or oak-hickory woods, moist woodlands, low marshy land, in flatwoods, semi-shaded areas, moist places near roads, in oak-hickory or pine-oak-hickory forests or mixed deciduous forests, and in limestone quarry talings, along roadsides and low roadsides, brooks and creeks, in moist pebbly ground and in damp ground of pastures, in dry or clay soil, swampy or moist open weedy soil, in low brushy soil, and sand or clay as well as in well-drained gravelly sandy loam, on open or wooded limestone

hillsides, limestone cliffs, wooded bottomlands, riverbanks and wooded riverbanks, stream banks, rocky creek bottoms and banks, creek bottoms and flat open gulch bottoms, on dry wooded banks, wooded and loamy wooded slopes, rich sandy slopes, and grazed woodlots. It has been found at the edges of meadows and woods, at the margins of woodlands, the base of limestone cliffs in rich oak-sugar maple woods, and at woodland and low woodland borders, often growing in the shade, at altitudes of 200 to 1200 feet, flowering from June to September, and fruiting from July to October.

In New Jersey it is said by Mackenzie to be "common in woodlands"; in Iowa it is described by Pammel & Spiker as growing as a common weed in low ground in pastures, widely distributed, associated with Scirpus atrovirens, Echinochloa crus-galli, and Persicaria lapathifolia. Schallert says that in Wisconsin it is "weedy but not troublesome", while in Indiana it is called a "weed in old pastures" by Ek. In North Carolina it grows in the "maple-birch-magnolia association" according to Radford. Johnson says "not common in heavily grazed pasture" in Wisconsin, while Struik found it in "mesic woods with Acer saccharum, Ulmus americana, U. rubra, Tilia americana, etc." in the same state.

Material of V. urticifolia var. leiocarpa has been misidentified and distributed in herbaria under the names V. caroliniana L., V. hastata L., V. hastata x urticifolia Eggert, V. polystachya H.B.K., V. scabra Vahl, V. urticaefolia L., V. urticaefolium L., V. urticiaefolia L., V. urticifolia L., and V. urticifolia Gray & Small. On the other hand, the Friesner 6044 and H. N. Moldenke 15426 distributed as V. urticifolia var. leiocarpa are typical V. urticifolia L. instead. The Herb. Hort. Bot. Genev. s.n. [18 Aug. 1826], cited below, is a mixture with V. recta H.B.K. H. N. Moldenke 13981 is infested with Erysiphe cichoracearum P. DC., determined by Dr. F. D. Kern. Plymale 542 has very short hairs. F. R. Fosberg 15695 is said to have had "pinkish-white" flowers, while Eames & Wiegand 12796 had "pink" flowers -- both collections may represent var. incarnata (Raf.) Moldenke. P. Johnson 33 may actually be the typical form of the species. E. E. Chambers 27 has inflorescences exactly like those of var. leiocarpa, but all its other characters are those of typical V. urticifolia, so I am citing it as that.

The Bouché s.n. cited below does not have any indication on its label that it came from cultivated material, but I am assuming that it did. The "Stearns" County, West Virginia, recorded for this variety by me in my Résumé 9 (1959) appears to be an error in transcription for Stearns County, Minnesota.

Eggleston 4841, Grimes 3794, Visher 2263, Rydberg 1716, Aiton 8467, Baker s.n. [St. Croix Falls], Gibbes s.n. [Charleston], Schuette s.n. [Green Bay], and J. K. Small s.n. [Reed Creek] are all cited by Perry (1933) as typical V. urticifolia, but this was

done before she recognized the variety, which these collections actually represent. G. N. Jones (1945), however, again reduces the variety to synonymy under V. urticifolia. J. A. Harris C. 15997 is a mixture with typical V. urticifolia.

Core records the variety from Pocahontas County, West Virginia, while Deam, Yuncker, & Friesner (1947, 1948, 1951, 1952) record it from Daviess, Delaware, Fountain, Huntington, Orange, Owen, and Steuben Counties, Indiana.

In all, 379 herbarium specimens and 1 mounted illustration have been examined by me.

Citations: NEW YORK: Bronx Co.: T. W. Edmondson 1492 (N); G. V. Nash s.n. [Bronx Park, July 14, 1896] (N). Dutchess Co.: Standley & Bollman 11996 (W--895562). Orange Co.: Raup 7603 (N). Queens Co.: Ferguson s.n. [Kew Gardens, 8-1-19] (N). Steuben Co.: H. N. Moldenke 20554 (N). Suffolk Co.: Ferguson 4382 (N); J. A. Harris C.15997, in part (B); L. K. Henry s.n. [July 23, 1926] (Cm); Shull 543 (N). Tompkins Co.: Eames & Wiegand 12796 (S). Ulster Co.: Macfarlane s.n. [Phoenicia Valley] (Up--46414); Whitney 4803 (Al). Westchester Co.: Herb. N. Y. Bot. Gard. s.n. [July 13, 1896] (N), s.n. [August 5, 1896] (N); Monachino 467 (Ec, N); W. A. Weber 1043 (Bl--48171). County undetermined: Herb. Torrey s.n. [New York] (T); J. Torrey 747 (Al). NEW JERSEY: Burlington Co.: H. N. Moldenke 21875 (Fg). Camden Co.: J. M. Fogg 7633 (Up). Cape May Co.: Fender 1159 (Up); Macfarlane s.n. [Holly Beach, Sept. 1, 1907] (Up--45857). Essex Co.: K. K. Mackenzie 349 (Dm, N). Gloucester Co.: J. M. Fogg 8642 (Up); B. H. Long 26200 (Ca--882843). Mercer Co.: J. M. Fogg 5376 (Up). Morris Co.: Reis s.n. [Lake Hopatcong, Aug. '89] (N). Somerset Co.: J. M. Fogg 12324 (Up), 12395 (Up); H. N. Moldenke 11788 (N), 18362 (Ec). Sussex Co.: Krausser & Cohen s.n. [Aug. 24, 1938] (Up). Union Co.: P. Wilson s.n. [Plainfield, Sept. 1901] (N). Warren Co.: Ahles 929/48 (Ur). PENNSYLVANIA: Bedford Co.: Berkheimer 1188 (Up). Chester Co.: F. R. Fosberg 15695 (Up). Clearfield Co.: O. E. Jennings s.n. [Aug. 25, 1925] (Cm). Clinton Co.: M. T. Travis 2801 (Up). Columbia Co.: F. R. Fosberg 15987 (Up). Delaware Co.: J. M. Fogg 10069 (Up); W. Stone 5572 (Up). Franklin Co.: A. R. Moldenke 100 (Fg). Greene Co.: O. E. Jennings s.n. [9/3/40] (Cm). Lackawanna Co.: Glowenke 581 (Up). Lawrence Co.: Henlen 61 (Cm). Northampton Co.: Jennings, Jennings, & Gress s.n. [July 28, 1920] (Cm); R. L. Schaeffer 3327 (Ok). Northumberland Co.: P. R. Wagner 9063 (Up). Pike Co.: DePue 356 (Up). Schuylkill Co.: P. R. Wagner 5852 (Up), 6036 (Up). Snyder Co.: J. M. Fogg 17907 (Up). Somerset Co.: Shetler 290/3 (N). Sullivan Co.: F. R. Fosberg 15940 (Up). Washington Co.: L. K. Henry s.n. [9/13/40] (Cm). Wayne Co.: Jennings, Jennings, & Gress s.n. [Aug. 21, 1920] (Cm). Westmoreland Co.: E.

H. Graham s.n. [July 15--22, 1923] (Cm); L. K. Henry s.n. [9/11/40] (Cm). MARYLAND: Allegeny Co.: R. C. Alexander s.n. [Allegheny, July '49] (Ca--379998). Garrett Co.: J. D. Smith s.n. [Aug. 15, '78] (W--1323136). Talbot Co.: E. C. Earle 3112 (Up). Worcester Co.: Raymond 197 (I). DISTRICT OF COLUMBIA: F. Blanchard s.n. [11 July 1891] (Or--14309); H. T. Holm s.n. [19/7/1912] (I, N, Ur), s.n. [1912] (S); P. B. Kennedy s.n. [July 27th, 1899] (Gg--186449). VIRGINIA: Bedford Co.: Curtiss s.n. [July 30, 1872] (Pu). Carroll Co.: H. N. Moldenke 19271 (N, Or). Charles City Co.: A. R. Moldenke 484 (Fg). Greensville Co.: Fernald & Long 10801 (Cn, H--68436, It, Ok). Isle of Wight Co.: Fernald, Griscom, & Long 6674 (N). James City Co.: A. R. Moldenke 482 (Fg). Loudoun Co.: Leonard & Killip 891 (Ur, W--1220059). Nansemond Co.: Kearney 1739 (W--356404); A. R. Moldenke 478 (Fg). New Kent Co.: A. R. Moldenke 483 (Fg, S). Norfolk Co.: A. R. Moldenke 480 (Fg). Page Co.: E. H. Walker 2654 (W--1839491), 2668 (W--1839505). Southampton Co.: Fernald & Long 6864 (Up). Sussex Co.: Fernald & Long 7588 (N, W--1699826). Wythe Co.: J. K. Small s.n. [Reed Creek, at base of Lower Rock, July 23, 1892] (C). Lynchburg: L. B. Henderson 1434 (Bt--44857). Williamsburg: Grimes 3794 (N); A. R. Moldenke 485 (Fg). WEST VIRGINIA: Barbour Co.: E. L. Core 5957 (We). Clay Co.: E. L. Core 6337 (We). Greenbrier Co.: R. B. Clarkson 2679 (We). Hancock Co.: Sumpstein s.n. [7/38] (We). Jackson Co.: Guthrie s.n. [July 18, 1953] (We). Mercer Co.: E. Dickinson 19 (We). Monongalia Co.: J. L. Sheldon s.n. [Dellslow, 7/9/18] (We); Shunk 344 (We); Strausbaugh 344 (We). Ohio Co.: R. West 686 (We). Preston Co.: Davis & Davis 766 (We); J. C. Myers 545 (Ur). Randolph Co.: E. E. Hutton s.n. [Huttonville, Aug. 26, 1938] (We); A. H. Moore 3541 (Up). Ritchie Co.: E. L. Core 5672 (We). Summers Co.: M. C. Beals s.n. [Camp Brookside, August 13--15, 1958] (We); Boone 251 (We). Tucker Co.: A. H. Moore 2110 (Io--131756). Wayne Co.: Plymale 542 (Ky). Webster Co.: Hinkle s.n. [August 17, 1957] (We). Wetzel Co.: Haught 626 (We). Wirt Co.: E. A. Bartholomew 1935-77, in part (We). Wyoming Co.: E. L. Core 1760 (Bt--48559). NORTH CAROLINA: Alleghany Co.: A. E. Radford 38401 (Hi--104434). Ashe Co.: Ashe s.n. [July 29] (Hi--59479); D. S. Correll 3981 (H--40253). Avery Co.: Ahles & Duke 47326 (Hi--104433). Bladen Co.: Ahles & Haesloop 29219 (Hi--104430). Buncombe Co.: D. S. Correll 79 (H--27637). Burke Co.: A. E. Radford 2556 (Hi--31120). Caldwell Co.: A. E. Radford 14988 (Hi--92887). Catawba Co.: D. S. Correll 2927 (H--40238); Correll & Oosting 2841 (Bt--35531). Cherokee Co.: A. E. Radford 17363 (Hi--110652). Craven Co.: A. E. Radford 37615 (Hi--104428). Currituck Co.: Ahles & Duke 48221

(Hi--104438). Duplin Co.: Ahles & Leisner 33221 (Hi--104447). Durham Co.: Oosting 33128 (H--17867). Edgecombe Co.: A. E. Radford 36752 (Hi--104448, S). Franklin Co.: Ahles & Leisner 20668 (Hi--92736). Gates Co.: Ahles & Duke 51483 (Hi--110653). Graham Co.: A. E. Radford 14217 (Hi--92890). Greene Co.: A. E. Radford 36592 (Hi--104449). Haywood Co.: Beaven 415 (Gu--10085); Blomquist 4714 (H--5456), s.n. [Lake Junaluska, July 1, 1930] (Bt--17342); N. Hall 87 (Fl--29037); A. L. Price 425 (N). Hertford Co.: Ahles & Haesloop 52358 (Hi--112963, Hi--112964). Iredell Co.: Ahles & Duke 48761 (Hi--112966, Hi--112967). Jackson Co.: A. R. Moldenke 53 [H. N. Moldenke 21777] (Bm). Jones Co.: A. E. Radford 37277 (Hi--104450). Lenoir Co.: A. E. Radford 28878 (Hi--92740). Lincoln Co.: C. R. Bell 15303 (Hi--146190). Macon Co.: A. E. Radford s.n. [Aug. 24, 1946] (Hi--35249), s.n. [Sept. 1, 1948] (Hi--35124). Mitchell Co.: Ashe s.n. [Roan Mtn., July 1893] (Hi--59467). Northampton Co.: Ahles & Haesloop 52500 (Hi--112971). Pitt Co.: A. E. Radford 39635 (Hi--104471). Polk Co.: E. C. Townsend s.n. [July 11, 1899] (Pl--86891). Robeson Co.: Britt 2339 (Hi--177878). Sampson Co.: Ahles & Haesloop 29971 (Hi--104468). Scotland Co.: Ahles & Haesloop 28791 (Hi--104469). Stokes Co.: A. E. Radford 37762 (Hi--104470). Swain Co.: D. S. Correll 3709 (H--40250); J. Mooney s.n. [Qualla] (W--2177849); A. E. Radford 17012 (Hi--92743). Wake Co.: R. K. Godfrey 4990 (Hi--10466, No--8600). Warren Co.: C. R. Bell 4199 (Hi--92802). Washington Co.: A. E. Radford 38761 (Hi--104464). Wilkes Co.: Radford & Stewart 1755 (Hi--16062). Yancey Co.: Ahles & Duke 46724 (Hi--121520, Hi--121521). SOUTH CAROLINA: Bamberg Co.: Ahles & Haesloop 30535 (Hi--104431). Berkeley Co.: Ahles & Haesloop 30751 (Hi--104432). Charleston Co.: Gibbes s.n. [Aug. 19, 1859] (N). Clarendon Co.: A. E. Radford 28214 (Hi--92733). Colleton Co.: J. H. Rice s.n. [Aug. 4, 1927] (Hi--59474). Darlington Co.: W. C. Coker s.n. [July 8, 1909] (Hi--59465); B. E. Smith 1462 (Hi--26477). Dorchester Co.: Ahles & Haesloop 37876 (Hi--121519); Ahles & Leisner 31948 (Hi--104426). Florence Co.: C. R. Bell 13353 (Hi--121526). Georgetown Co.: Tarbox s.n. (N). Lancaster Co.: Ahles 34786 (Hi--104475). Lexington Co.: E. A. McGregor 258 (Du--75708, W--984754). Oconee Co.: A. E. Radford 17859 (Hi--92896). Orangeburg Co.: Ahles & Leisner 31725 (Hi--104473). Pickens Co.: A. E. Radford 16874 (Hi--90515). Saluda Co.: A. E. Radford 26869 (Hi--92747). Sumter Co.: A. E. Radford 27478 (Hi--92744). Union Co.: O. M. Freeman 56527 (Hi--92801). Williamsburg Co.: Godfrey & Tryon 466 (W--1837344). York Co.: Ahles 34508 (Hi--104460, Hi--104461). Witherspoon Island: B. E. Smith 1463 (Hi--

26476). FLORIDA: Leon Co.: Rugel s.n. [Tallahassee, Mai 1843] (Go). OHIO: Cochocton Co.: H. N. Moldenke 12529 (Co--535), 12777 (Co--1012), 12989 (Co--1179), 13142 (Co--1239), 13981 (Co--2170, Da). Hamilton Co.: E. L. Braun s.n. [Anderson's Ferry, July 24, 1917] (Cn); C. G. Lloyd s.n. [July 24, 1882] (Pl--72007). ILLINOIS: Alexander Co.: G. N. Jones 12031 (Il--15823, N, Ur). Champaign Co.: N. H. Bell 160 (Ur); Herb. Univ. Ill. 17466 (Ur); Seymour s.n. (Ur--17467); Waite s.n. (Ur--29663). Coles Co.: G. D. Fuller 10700 (Il--21850). McLean Co.: G. D. Fuller 211 (Il--15824), 7441 (Ur). Moultrie Co.: Winterringer 9129 (Il--39406). Piatt Co.: G. N. Jones 19214 (Ur). County undetermined: Stark s. n. [8/9/23] (Dp). INDIANA: Bartholomew Co.: C. C. Deam 36909 (Dm); Friesner 12936 (Bt--42833). Blackford Co.: C. C. Deam 173 (Dm). Brown Co.: Friesner s.n. [Trevlac, 7/12/30] (Bt--4043). Carroll Co.: C. C. Deam 51087 (Dm). Dearborn Co.: Friesner 12490 (Bt--42189). Decatur Co.: Friesner 7198 (Bt--17515). Fayette Co.: C. C. Deam 52508 (Dm). Franklin Co.: C. C. Deam 36974 (Dm). Grant Co.: C. C. Deam 2474 (Dm). Greene Co.: Friesner 5243 (Bt--9936). Hamilton Co.: Friesner 17250 (Bt--63440); H. Morrison s. n. [Noblesville, July 17, 1910] (Du--9543). Hancock Co.: Ek s.n. [6-27-1942] (Bt--64524). Jay Co.: C. C. Deam 50722 (Dm). Jefferson Co.: Friesner 13148 (Bt--43663). Jennings Co.: C. C. Deam 37007 (Dm). Madison Co.: C. C. Deam 2462 (Dm). Miami Co.: Ek s. n. [Sept. 20, 1941] (Dp--27408), s.n. [July 1, 1942] (Dp--33116). Monroe Co.: Friesner 6003 (Bt--12739). Montgomery Co.: C. C. Deam 32801 (Dm). Morgan Co.: C. C. Deam 2261 (Dm). Orange Co.: Friesner 22803 (B, N, S). Parke Co.: Daubenmire s.n. [July 20, '29] (Bt--3509). Porter Co.: C. C. Deam 39523 (Dm). Randolph Co.: C. C. Deam 63096 (N). Ripley Co.: C. C. Deam 58103 (N). Scott Co.: C. C. Deam 28024 (Dm). Vermillion Co.: C. C. Deam 53143 (Dm). Washington Co.: C. C. Deam 37137 (Dm). Wayne Co.: C. C. Deam 50744 (Dm). White Co.: C. C. Deam 39321 (Dm). Whitley Co.: C. C. Deam 57147 (Dm). IOWA: Allamakee Co.: L. H. Pammel s.n. [Aug. 18, 1929] (Io--133994). Boone Co.: Pammel, Buchanan, & King 3920 (Io--33058). Butler Co.: Whaley s.n. [July 24, 1918] (Io--138472). Cass Co.: A. R. Moldenke 935 (Lw, Ut). Chickasaw Co.: Pammel & Spiker 683 (Io--119144). Dallas Co.: L. H. Pammel s.n. [Dawson, Aug. 16, 1918] (Io--95630). Delaware Co.: A. R. Moldenke 984 (Lw). Floyd Co.: Arthur s.n. [Charles City, July 15, 1872] (Ah), s.n. [Charles City, 7/16/1872] (Ah), s.n. [Charles City, 7/15/81] (Ah). Greene Co.: L. H. Pammel s.n. [Churdan, Jul. 29, 1928] (Io--132870). Hardin Co.: L. H. Pammel s.n. [Steamboat Rocks, 9-12-12] (Io--52671). Howard Co.: L. H. Pammel s.n. [Sara-

toga, Sept. 2, 1919] (Io—96236). Jasper Co.: Sipe s.n. [Colfax, Jul. 1922] (Io—105826). Marshall Co.: Pammel & Fogel 4075 (Io—42398). Poweshiek Co.: Mrs. E. J. Hill s.n. [Montgomery] (Io—107762). Story Co.: Fawcett, Tener, & Reinbott s.n. [Slater, Sept. 13, '02] (Io—42578); A. Hayden s.n. [August 10, 1932] (N); A. S. Hitchcock s.n. [Ames, July '82] (Io—15332). Union Co.: T. L. Andrews s.n. [Creston] (Io—22903). Winneshiek Co.: Goddard s.n. [7-6-95] (Io—72018); Holway s.n. [July 16, 1881] (Io—38762). KENTUCKY: Edmonson Co.: Lix 433 (W—1948073). Estill Co.: Wharton 5186a (N). Marshall Co.: Eggleston 4841 (N). TENNESSEE: Carter Co.: D. M. Brown 137 (H—40221). Greene Co.: A. R. Moldenke 55 (H. N. Moldenke 21779] (Bm). Obion Co.: Jennings & Jennings s.n. [Reelfoot Lake, 1924] (Cm). Roane Co.: Nease 515 (W—2175280). Sevier Co.: Wehmeyer 361 (Mi, N). MICHIGAN: Ingham Co.: L. H. Bailey s.n. [Lansing, 1879] (Ba); M. Craig 12088 (Ca—367851). Menominee Co.: Grassl 2702 (Mi). Monroe Co.: B. Robertson 318 (Mi). WISCONSIN: Beloit Co.: Herb. Scient. Assoc. Beloit Coll. s. n. (Ws). Brown Co.: P. O. Schallert 338 (H—5481); Schuette s.n. [July 7, 1878] (N). Buffalo Co.: H. H. Smith 7180 (Ws). Fond du Lac Co.: A. R. Moldenke 1015 (Lw, Ut). Green Co.: E. W. Fell 58-620 (Ws); Struik s.n. [August 19, 1956] (Ws); Stuntz s.n. [July 14, 1891] (Ws). Juneau Co.: L. S. Cheney 3711 (Ws). LaCrosse Co.: T. G. Hartley 1962 (W—2262066). Lafayette Co.: P. K. Nelson s.n. [July 23, 1946] (Ws). Milwaukee Co.: Hasse s.n. [Milwaukee] (N); Lapham s.n. (Ws). Outagamie Co.: F. C. Seymour 10153 (Ws). Polk Co.: Mrs. C. F. Baker s.n. [C. F. Baker 10693] (Po—64652); Benner & Benner 105 (Ws); M. Johnson s.n. [Aug. 15, 1960] (Ws); R. W. Pohl 516 (Ws). Rock Co.: J. Wickham 16 (Ws). Saint Croix Co.: De Byle s.n. [12 Aug. 1952] (Ws). Sauk Co.: J. H. Zimmerman 1188 (Ws). Sheboygan Co.: Goessl s.n. [Aug. 1919] (Ws). Walworth Co.: Almon s.n. [July 23, 1926] (Ws). MINNESOTA: Beltrami Co.: Westley s.n. [Black Duck, Jul. 22, 1918] (Io—94363). Freeborn Co.: L. H. Pammel s.n. [VIII-28-'27] (Io—130033). Goodhue Co.: N. L. T. Nelson s.n. [Goodhue, Aug. 1899] (La, Ur); J. H. Sandberg s.n. [July 1886] (B). Hennepin Co.: G. B. Aiton 8467 (Po—64650); Cratty s.n. [Minneapolis, Aug. 1, 1924] (Io—115410); J. H. Sandberg 597 (Fc—2281), s.n. [July 1890] (Ca—25175, Ca—25176). Mower Co.: J. F. Brenckle 47-548 (N). Ramsey Co.: Mearns s.n. [Fort Snelling, Aug. 21, 1891] (W—670318), s.n. [Fort Snelling, Aug. 25, 1891] (W—670319). Rice Co.: G. K. Knight s.n. [Northfield, 8/11/33] (Bt—31377). Saint Louis Co.: G. N. Jones 18597 (Ur). Stearns Co.: Chandonnet s.n. [July 29, 1912] (Up—60543). NORTH DAKOTA: Ramsey Co.: Geyer 105 (W—71962). Ransom

Co.: Bergman 1077 (Cm). Richland Co.: W. B. Bell 242 (Ca--587764), 465 (Gu--21808); O. A. Stevens s.n. [Leonard, July 25, 1949] (W--2004204). Stutsman Co.: Lunell 869 (Ur), s.n. [Jamestown, Aug. 22, 1913] (N), s.n. [Jamestown, Aug. 24, 1913] (W--893166, W--893167). SOUTH DAKOTA: Bennett Co.: Visher 2263 (N). Clay Co.: Over 4037 (W--789742), s.n. [Aug. 5, 1915] (Se--149144). Minnehaha Co.: P. Johnson 33 (Bt--62601, Ky, Lb--36393, N, Ur). Roberts Co.: Over 14385 (W--1242263); L. H. Pammel s.n. [Sisseton, Aug. 10, '17] (Io--99477). Shannon Co.: Over 16175 (Gg--130641). KANSAS: Riley Co.: F. C. Gates 12775 (Ob--50849). MISSOURI: Greene Co.: P. C. Standley 9435 (W--688351). ARKANSAS: Newton Co.: Demaree 22240 (N, Z). Phillips Co.: Demaree 19745 (N, Sm). NEBRASKA: Cherry Co.: J. M. Bates s.n. [Valentine, Aug. 16, 1893] (Ur). Knox Co.: F. E. Clements 2743 (W--202568). Thomas Co.: Rydberg 1716 (N, W--210372). Washington Co.: Lallman s.n. [Aug. 26, 1926] (Bt--32236). OKLAHOMA: Canadian Co.: M. Hopkins 2099 (Ok). Cherokee Co.: E. L. Little 528 (Ok); Stratton 6592 (N); C. S. Wallis 928 (St). Cleveland Co.: W. S. Myers 5 (Ok). McCurtain Co.: Hopkins & Cross 2296 (Ok). Muskogee Co.: Waterfall 10150 (St). Oklahoma Co.: Stemen 334 (Ok); Waterfall 1773 (Ok, St). County undetermined: Flowers 46 (Ok); Waugh s.n. [Clarkson, 6/22/1893] (W--266934). TEXAS: Cass Co.: Whitehouse 17697 (Sm). CULTIVATED: Germany: Bouché s.n. (Gg--31435). Switzerland: Herb. Hort. Bot. Genev. s.n. [18 Aug. 1826] (W--264565). LOCALITY OF COLLECTION UNDETERMINED: Mackaness s.n. [eastern N. Y. and e. Pa., 1936--37] (Tl). MOUNTED ILLUSTRATIONS: Perry & Fernald in Fernald, Rhodora 38: pl. 450, fig. 5--8. 1936 (N).

xVERBENA URUGUAYENSIS Moldenke, Castanea 13: 118, nom. nud. 1948; hybr. nov.

Synonymy: Verbena melindres x tenera Osten ex Moldenke, Résumé 369, in syn. 1959. Verbena peruviana (L.) Britton x V. tenera Spreng. ex Moldenke, Résumé 372, in syn. 1959. Verbena tenera Spreng. x V. peruviana (L.) Britton ex Moldenke, Résumé 376, in syn. 1959.

Bibliography: Moldenke, Castanea 13: 118. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 100 & 200. 1949; Moldenke, Résumé 120, 369, 372, 376, & 474. 1959; Moldenke, Phytologia 8: 121 (1961), 10: 289 (1964), and 11: 271 & 272. 1965.

Planta inter V. peruviana (L.) Britton et V. tenera Spreng. hybrida naturalis, aspectu foliorum florumque parentis intermedio.

This is the natural hybrid between V. peruviana (L.) Britton and V. tenera Spreng. which occurs where the ranges of these two species overlap in the states of Rio Grande do Sul and Santa Catarina, Brazil, in Uruguay, and in the provinces of Buenos Aires, Catamarca, Córdoba, Corrientes, La Rioja, Santa Fé, & Tucumán, Ar-

gentina.

Osten, in speaking of xV. trinitensis Moldenke, says: "Er entspricht ganz genau dem spontanen Bastard der Uruguay flora: Verbena [Nobiles, chamaedryf.] Melindres Gill. (rot) x [Glandularia, erinoides] 'tenera' Auct. (violett) (Briq. -- an Sprengel?) der ebenfalls rosa Blüten hat, dadurch wie obriger leicht unter den Eltern aufzufinden ist." The plant should have considerable horticultural merit.

xVERBENA VAGA Moldenke, Phytologia 5: 133. 1955.

Synonymy: Glandularia santiaguensis x megapotamica Schnack & Covas, Rev. Argent. Agronom. 12: 222, 224, & 228. 1945. Glandularia santiaguensis x megapotamica Covas & Schnack ex Moldenke, Phytologia 5: 133, in syn. 1955. Verbena megapotamica Spreng. x V. santiaguensis (Covas & Schnack) Moldenke, Résumé 369, in syn. 1959. Verbena santiaguensis (Covas & Schnack) Moldenke x V. megapotamica Spreng. ex Moldenke, Résumé 373, in syn. 1959.

Bibliography: Schnack & Covas, Revist. Argent. Agronom. 12: 222, 224, & 228. 1945; Schnack & Gonzalez, Revist, Argent. Agronom. 12: 285, 286, & 288--290, fig. 1 B, D, & E, & 3, pl. 15 A, B, & C. 1945; Moldenke, Phytologia 3: 468 (1951) and 5: 133. 1955; Moldenke, Biol. Abstr. 30: 1093. 1956; Moldenke, Am. Midl. Nat. 59: 362-363. 1958; Moldenke, Résumé 225, 296, 369, 373, 420, 421, & 474. 1959; Moldenke, Résumé Suppl. 2: 13. 1960; Moldenke, Phytologia 8: 121. 1961; Moldenke, Résumé Suppl. 8: 2 & 3. 1964; Moldenke, Phytologia 10: 133 (1964) and 11: 135. 1964.

This is the natural hybrid between V. santiaguensis (Covas & Schnack) Moldenke and V. megapotamica Spreng. found originally among the parents in the Experimental Garden of the Escuela de Agronomía in Mendoza, Argentina, and also produced artificially by Schnack and Covas in Argentina. The two parental species grow together in Uruguay and the hybrid may be expected in the wild state there. They also grow in parts of Argentina, but I have not as yet seen any wild specimens of both from the same province of that country. The hybrid should offer considerable horticultural promise and deserves more experimental study.

Under xV. schnackii Moldenke, in these notes, it is stated that the two parental species have a relatively small affinity based on the evidence of the cytologic pattern and the completely sterile pollen. This shows a good correlation with the large morphological differences between the two parents.

Schnack & Covas (1945) say "Asi mismo hemos podido identificar en el jardín experimental de la Escuela de Agronomía de Mendoza el híbrido natural Glandularia santiaguensis x G. megapotamica; poseemos también otros híbridos naturales que aun no hemos estudiado."

VERBENA VALERIANOIDES H.B.K., Nov. Gen. & Sp. Pl. 2: 277. 1818 [not V. valerianoides St.-Hil., 1947].

Synonymy: Verbena valerianoides Humb. ex Spreng. in L., Syst. Veg., ed. 16, 2: 747. 1825. Verbena valerianoides Humb. & Bonpl. es Steud., Nom. Bot., ed. 2, 2: 751. 1841. Verbena valerianoides Humb. & Kunth ex D. Dietr., Syn. Pl. 3: 600. 1843. Verbena valerianoides Kunth ex Schau. in A. DC., Prodr. 11: 542. 1847.

Bibliography: H.B.K., Nov. Gen. & Sp. Pl. 2: 277. 1818; Steud., Nom. Bot., ed. 1, 874. 1821; Spreng. in L., Syst. Veg., ed. 16, 2: 747. 1825; Steud., Nom. Bot., ed. 2, 2: 751. 1841; D. Dietr., Syn. Pl. 3: 600. 1843; Walp., Repert. Bot. Syst. 4: 20. 1845; Benth., Pl. Hartw. 245. 1846; Schau. in A. DC., Prodr. 11: 542. 1847; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1180. 1895; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 31 & 102. 1942; Moldenke, Alph. List Invalid Names Suppl. 1: 27. 1947; Moldenke, Alph. List Cit. 2: 557 & 573 (1948) and 3: 696 & 805. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 62 & 200. 1949; Moldenke, Résumé 69 & 474. 1959; Moldenke, Résumé Suppl. 4: 20 (1962) and 6: 5. 1963; Moldenke, Phytologia 9: 97 & 114. 1963; Moldenke, Résumé Suppl. 8: 6. 1964.

Glabrous herb, often tall and weak; stems erect, tetragonal; branches erect; leaves decussate-opposite, sessile, linear, about 3 cm. long and 4 mm. wide, rather acute at the apex, entire, revolute-margined, rigid, venose, with a few scattered hairs above; inflorescence terminal, pedunculate, ternate and 3-spiked; spikes cylindric, very dense, 0.8--1.6 cm. long; peduncles abbreviated; bractlets ovate, acute at the apex, about half as long as the calyx; flowers small; calyx short-tubular, about 3 mm. long, strigillose-scabrous, the rim mucronate-5-dentate; corolla small, varying from light-blue, blue, or blue-violet to lavender-blue or violet, slightly surpassing the calyx-tube.

The type of this rather distinctive species was collected by Friedrich Heinrich Alexander von Humboldt and Aimé Jacques Alexandre Bompland "in frigidis Andium prope Santa Fé de Bogota et Chipo, alt. 1370 hex.", Cundinamarca, Colombia, deposited in the herbarium of the Botanisches Museum at Berlin, photographed there by Macbride as his type photograph no. 39476, but now destroyed. Schauer (1847) cites also Hartweg 1350 from "In Andibus Columbiae" in the same herbarium. He says "Proxima et persimilis praecedenti [V. litoralis H.B.K.] tamen uti videtur foliis integerrimis calyceque longiore satis distincta." Walpers (1845) places the species in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Micranthae, and Secondary Subgroup Holophyllae, with 22 other species. The original authors comment "Habitu Valerianis nonnullis valde accedens."

It has been found in wet fields, fields at the base of hills, and along streams, at altitudes of 2600 to 3250 meters, flowering in May, August, October, and November. Schneider found it "very abundant in moist meadows and brook margins", Langenheim calls it "common in marshes", while Barclay & Juajibioy describe it as "growing up through shrubs at edge of small stream in great stretches of open paramo with dried slopes and wet flats."

CLEOME ORNITHOPODIOIDES L. ON VANADIUM-SLAG AT CANTON, BALTIMORE, MARYLAND WITH NOTES ON THE BIOGEOCHEMISTRY OF VANADIUM

Clyde F. Reed (1)

The author (2-6) has published several lists of the plants found on the various ore piles in Canton, Port of Baltimore, Maryland and in Newport News, Virginia. In 1964, some 536 species were listed or described from these piles, most of them having been found on chrome ore, iron ore or manganese ore.

In 1962-63 a small pile of vanadium-slag was dumped along Clinton Street in Canton, and on this pile in 1963 about 25 specimens of Cleome ornithopodioides Linn. came up. Specimens collected on August 20, 1963 (Reed 65408; dupl. in US and U. Wisc.) were sent to Dr. H. H. Iltis, Department of Botany at the University of Wisconsin, where identification was verified. This species is new to the flora of North America.

The species came up again in 1964, spreading to cover the pile (about 10 ft. in diameter and 5 ft. high). Seedlings about 6 inches tall were transplanted for study. Some of these plants were in flower and even in fruit with ripe seeds at this time. (June 23, 1964, Reed 66675). The seedlings were potted in normal garden soil. However, the plants showed little growth for three weeks. Then, I added some of the fine vanadium-slag to the soil and watered it in. Within two weeks the plants were 1-1/2 to 2 feet tall, which equalled the heights of plants collected on the slag pile on August 14, 1964 (Reed 58183). Seeds from No. 58183 were sent to Dr. Iltis for further study.

Cleome ornithopodioides Linn. Native in the southern Balkans and the Near East. (Persia bor. et austr.; Tauria; Caucasus; Armenia; Anatolia, Smyrna; Russia).

An annual, up to 60 cm. tall, stems glandular-pubescent; leaves trifoliate, about 2.5 cm. long, including the 1 cm. petiole; leaflets oblong-linear; flowers white with a tinge of pink,

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1. Botanist, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Maryland.
2. Reed, Rhodora 56: 178-181. 1954.
3. Reed, Castanea 26: 123-127. 1961.
4. Reed, Castanea 26: 128. 1961.
5. Reed, Castanea 27: 59-61. 1961.
6. Reed, Phytologia 10(5): 321-406. 1964.

about 2-4 mm. in diameter; sepals sometimes with a blackish margin; stamens 6, free at the base; silique glandular-pubescent, 2-2.5 cm. long, with 9-10 black, smooth seeds. The seedlings start to flower about the fourth node above the ground. From specimens studied, collected on vanadium-slag pile in Canton, Baltimore, Maryland, in 1963 and 1964. Exact data recorded above.

Vanadium is not usually considered a micronutrient element for most plants. However, for Cleome ornithopodioides Linn., it seems to accelerate growth. Cannon(7) reported that Cleome integrifolia had up to 70 ppm. in the ash.

The most complete review of the biogeochemistry of vanadium until 1950 is that by Bertrand(8), in which the occurrence of vanadium in soil, animals and plants is thoroughly surveyed and critically evaluated. A fine bibliography for the subject is given. Several more recent works evaluate the tolerance, resistance, toxicity, accumulation, and nutrient value of vanadium in various types of plants.

Biebl(9) studied the resistance of plant plasm to vanadium, using solutions of $VOSO_4$ in percent solutions from 20 to 0.0001. Among the Bryophytes studies, these species could tolerate percent solutions up to the following: Mnium rostratum - 3.0; Mnium undulatum - 5.0; Mnium punctatum - 3.0; Plagiochila asplenioides - 3.0; Bazzania trilobata - 10.0; and Trichocolea tomentella - 5.0. Among our cultivated plants of economic value Solanum tuberosum could tolerate solutions 0.0001 or less; Solanum lycopersicum (Lycopersicum esculentum) Beta vulgaris subsp., Raphanus sativus, Daucus carota and Allium cepa, up to 0.001; Rheum rhabarbarum, and Brassica oleracea var. gongylodes, up to 0.01 Among some weedy plants tested, Polygonum lapathifolium, Atriplex patulum, Mercurialis annua, Atropa belladonna, Solanum nigrum, Datura stramonium, Senecio vulgaris, Helianthus annuus

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7. Cannon, Helen L. Effect of Uranium-Vanadium Deposits on the Vegetation of the Colorado Plateau. Amer. Jour. Sci. 250 (10): 735-770. Oct. 1952.

8. Bertrand, Didier. Survey of Contemporary Knowledge of Biogeochemistry. 2. The Biogeochemistry of Vanadium. Bull. Amer. Mus. Nat. Hist. 94: 403-456, tables 1-5. 1950.

9. Biebl, Richard. Ueber die Resistenz Pflanzlicher Plasmen gegen Vanadium. Protoplasma 39(2): 251-259, 2 tables. 1950.

and Artemisia campestris could withstand concentrations up to 0.001 percent. Among the plants usually cultivated for ornamental purposes, Begonia scharffiana (0.0001), Cyclamen persicum (0.001), Iris pallida (0.01), Iris florentina (0.001), Iris pumila (0.001), Iris trojana (0.01), Rhoeo discolor (1.0), Tradescantia purpusi (0.001) Tradescantia zebrina (0.0001) and Cephalanthera rubra (0.001) were resistant to solutions up to the given percentages.

Suzuki(10) found that the sulfate of vanadium in a culture medium having 100 ppm. was poisonous to barley. On the other hand, Kumar and Lall(11) found that in solutions of vanadium oxide up to 0.01 ppm. the vitamin C concentration increased in tomatoes, but the fruits became more sour. Chiu(12) found that growth was increased in rice seedlings by application to the nursery beds of solutions of vanadium oxide, with the best results at 150 ppm. Arnon(13) found increased growth in lettuce and asparagus when up to 0.001 ppm. of vanadium was added to the culture solution.

Among the lower plants vanadium plays an important role in the nitrogen fixation of Azotobacter species (14-17). The data

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10. Suzuki, S. On the action of vanadium compounds on plants. Tokyo Bull. Agr. 5: 515. 1903.

11. Kumar, K. and S. B. Lall. Effect of vanadium on chemical composition of tomato fruits. Indian Sci. Cong. Proc. 40(3): 118. 1953 (1954).

12. Chiu, T. F. The effect of vanadium application on the paddy rice. Agr. Res. 4(2): 48-59. Sept. 1953.

13. Arnon, D. I. Microelements in culture solution experiments with higher plants. Amer. Jour. Bot. 25: 322-325. 1938.

14. Konishi, Kametaro and Tsuge Toshihisa. Effect of inorganic constituents of soil solution on the growth of Azotobacter. Jour. Agr. Chem. Soc. Japan 9: 510-520. 1933.

15. Burk, D. and C. K. Horner. The specific catalytic role of molybdenum and vanadium in nitrogen-fixation and amide utilization by Azotobacter. Internat. Soc. Soil Sci., 3rd Congress, Trans. 1: 152-155. 1935.

16. Bore, J., Bore, C. and D. I. Arnon. Molybdenum and vanadium requirements of Azotobacter for growth and nitrogen fixation. (Abs.) Plant Physiol. 32(Sup.): xxiii. 1957.

pertinent to the effect of vanadium on nitrogen-fixing organisms is reviewed by Nason(18). Jensen and Spencer(19) studied the influence of vanadium on the nitrogen fixation by Clostridium butyricum and related organisms. Sampath(20) showed that sporulation in yeast cells was inhibited by 280 ppm. of vanadium, but was quite favorable with 140 ppm. Bertrand(21,22) showed that vanadium acted as a growth factor in concentration of 2×10^{-9}M for Aspergillus niger. Allen(23) found that vanadium could not be substituted for the molybdenum requirement of the blue-green alga, Anabaena. Among green algae, Arnon and Wessel(24) found that there was an 8-fold increase in the growth rates in the green alga, Scenedesmus obliquus, upon the specific addition of vanadium to the purified nutrient solution. Later, Arnon(25) reported that

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17. Becking, J. H. Species differences in molybdenum and vanadium requirements and combined nitrogen utilization by Azotobacteriaceae. Plant and Soil 16(2): 171-201. Apr. 1962.

18. Nason, Alvin. The metabolic role of vanadium and molybdenum in plants and animals. Chapter 19 in Trace Elements. 264-296. 1958.

19. Jensen, H. L. and D. Spencer. The influence of molybdenum and vanadium on nitrogen fixation by Clostridium butyricum and related organisms. Linn. Soc. N. S. Wales Proc. 72: 73-86. 1947.

20. Sampath, S. Effect of vanadium on yeast cells. Current Science (India) 13: 47. 1944.

21. Bertrand, D. Vanadium in plants. Bull. Soc. Chim. Biol. 23: 467-471. 1941.

22. Bertrand, D. Le vanadium comme element oligosynergique pour l'Aspergillus niger. Inst. Pasteur (Paris) Ann. 68: 226-244. 1942.

23. Allen, M. B. Sci. Monthly 83: 100-106. 1956.

24. Arnon, D. I. and G. Wessel. Vanadium as an essential element for green plants. Nature (London) 172: 1039-1040. 1953.

25. Arnon, Daniel I. The role of micronutrients in plant nutrition with special reference to photosynthesis and nitrogen assimilation. Trace Elements, Proc. Conf. Ohio Agr. Exp. Stat., Chap. 1. 1958.

the maximal level of the Hill reaction in photosynthesis by isolated chloroplasts was raised by the addition of vanadium.

Bechi(26) was the first (1879) to mention the existence of vanadium in the ashes of plants. There is considerable literature dealing with the methods and techniques for testing the amounts of vanadium in soils, and in plant and animal tissues. I shall only indicate some of the critical species which seem to have high percentages of vanadium in their tissues.

Among the fungi in 17 species tested, Amanitopsis muscaria showed from 60.8 to 181 ppm. in seven lots tested. Other species of some note are: Lactarius torminosus (12), Amanitina phalloides (2.4) ppm.), Amplariella spissa (1.0 ppm.) and Aspidella solitaria (1.8 ppm.), as recorded by Bertrand(8).

Czapek(27) found vanadium in the ash of red beets, sugar beets, grape vines, Fagus, Quercus, Picea, Abies and Carpinus. Cannon(7) presented an extensive study of the ash from plants collected in the Colorado Plateau region where there are large deposits of vanadium. It was found that plants absorb considerable quantities of vanadium through their roots and store some there, but do transfer some to the twigs and leaves. The leaves of plants rooted in ore contained from 40 to 200 ppm. as vanadium oxide, as compared to those of plants collected from barren sandstone and shale (which contained from 20 to 40 ppm. vanadium oxide). Among the plants studied, Astragalus pattersonii (12 ppm.); A. preussii arctus (3000 ppm.), A. confertiflorus (90 ppm.), Oryzopsis hymenoides (70 to 690 ppm.) and Stanleya arcuata (65-120 ppm.) also store up large quanties of selenium. Other plants that stored vanadium were: Atriplex confertifolia (10-90 ppm), A. canescens (25-30 ppm), Bahia nudicaulis (70 ppm.), Chrysothamnus viscidiflorus (50-200 ppm.), Artemisia spinescens (70 ppm.), Haplopappus armeroides (260 ppm.), Sarcobatus vermiculatus (400 ppm., roots) and Cowania mexicana (50-75 ppm. during the dormant period; 400 ppm. during the active period). In some trees and shrubs studied, the following ppm. of vanadium were observed; Ephedra viridis (70 ppm), Fraxinus anomala (5 ppm.), Juniperus monosperma (10-60 ppm.; 140-4000 ppm. in roots), Pinus edulis (about 10 ppm). and Quercus gambellii (5-90 ppm.; 1700 ppm in roots). A Spirogyra sp. showed 500 ppm.

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26. Bechi, E. Nuove richerche del boro e del vanadio. Atti Roy. Accad. Lincei, III, 3: 186. 1879.

27. Czapek, Fr. Biochemie der Pflanze, 2 Aufl. II. Bd. 1920. Jena.

Bertrand(28-30) reported vanadium in every sample of 62 species of plants studied. Most of the fungi had less than 0.5 ppm., except Amanita muscaria which is believed to live on the roots of conifers; it had 112 ppm. vanadium. Root nodules of most legumes had 3-4 ppm.; Vicia faba root nodules had 12 ppm. vanadium. Bertrand(8) presented a correlation study of the vanadium intake for six lots of legumes:

	Soil y-vanadium	Roots ppm.	Nodules ppm.	Aerial ppm.
Kidney bean	19.4	38.0	27.2	5.6
Black Tokyo Soya	23.7	27.6	32.6	5.2
Yellow lupine	54.3	24.2	21.5	12.8
White lupine Vendee	54.3	56.0	20.4	5.3
White lupine Versailles	23.7	25.8	27.8	2.97
Broad bean	32.0	75.0	48.5	4.4

Demarcay(31) reported vanadium in the ashes of Pinus sylvestris, Picea, Quercus, Vitis, Populus and Carpinus. Robinson, Steinkoening and Miller(32) found vanadium in six of the 50 plants studied, and reported most notable: kidney beans, sugar beets, pine needles and clover. However, Dimetriev(33) found that vanadium

28. Bertrand, D. Recherches sur le vanadium chez les végétaux. Inst. Pasteur (Paris), Ann. 68: 58-68. 1942.

29. Bertrand, D. Distribution of vanadium in plants. Bull. Soc. Chim. Paris, V, 9: 121-133. 1942.

30. Bertrand, D. Vanadium in fungi, especially Amanita. Bull. Soc. Chim. Biol. 25: 194-197. 1943.

31. Demarcay, E. Sur la présence dans les végétaux du vanadium, molybdènem et du chrome. Compt. Rend. Acad. Sci. Paris, 130: 91-92. 1900.

32. Robinson, W. O., L. A. Steinkoening and C. F. Miller. The relation of some of the rarer elements in plants and soils. Bull. U. S. Dept. Agr., No. 600: 1-25. 1917.

33. Dimetriev, K. S. The effect of microelements in limed podzol soils on the development and the crop of red clover. Pedology (USSR), No. 4: 114-133. 1939: Klim. Referat. Zhur., No. 11: 54. 1939.

had no effect on the development and growth of red clover in limed podzol soils of Russia. The presence of vanadium and other rarer metals in the soils of Russia have been reported by Vinogradov and Bergman(34) and by Arinushkina and Levin(35). It is in such regions of southern Russia that Cleome ornithopodioides Linn. grows naturally. It would be of interest to know whether or not this and other species are found only in relation to vanadium-carrying soils in Russia.

Vanadium has been studied in the soils of Argentina by Trelles and Amato(36), and its action on plant growth in Argentina was studied by Ramirez(37). In Hawaii this element in the soil was studied by Nakamura and Sherman(38). Riccardi(39) found 9.5 to 36.5 ppm. of vanadium in the lava of Mt. Etna; he also found that plants that grew in the lava of this volcano contained appreciable quantities of the element.

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34. Vinogradov, A. P. and Bergman, G.G. Chromium and vanadium in soils of the Soviet Union. Pochvovedenie, 1949; 569-573. Oct. 1949.

35. Arinushkina, E. V. and Levin, F. I. Content of vanadium, chromium, manganese, cobalt and nickel in the soils of the Agrobiologicheskaya Stantsiya of Moscow Gosudarstvennyi Universitet. In N. S. Avdonin, Povyshenie plodorodiya pochv nechernozemmoi polosy 1: 69-79. 1961.

36. Trelles, R. A. and Amato, F. D. Arsenico, vanadio y molibdeno en suelos y en algunos estratos de la Republica Argentina. Soc. Cient. Argentina An. 149: 93-107. 1950.

37. Ramirez, E. C. Vanadium and its action on plant growth. Am. Sci. Quim. Argentina 2(6): 145-146. 1914.

38. Nakamura, M. T. and Sherman, G. D. The vanadium content of Hawaiian Island soils. Hawaii Agr. Expt. Sta. Tech. Bull. 45: 1-20. 1961.

39. Riccardi, L. Sulla diffusione del vanadio nel regno minerale e vegetale. Atti Accad. Gioenia di Sci. Nat. Catania 17: 161-166. 1883.

40. Shibuya, K. and H. Saeki. Effect of vanadium on growth of plants. Jour. Soc. Trop. Agr. Japan 6: 721. 1934.

Shibuya and Saeki(40) studied the effect of vanadium on the growth of plants in Japan. While studying the effect of molybdenum on plants in nature, Ter Meulen(41) found that Amanita muscaria had 3.3 ppm. vanadium, garlic had 0.8 ppm., but that onions had none.

Although there is still no proof that vanadium is an essential micronutrient element in the plant kingdom, there is some evidence that in some lower plants and in a few higher plants, vanadium helps in the physiological activities of those plants. Mere traces seem to accelerate growth activities, as in Scenedesmus, Aspergillus, Azotobacter, and various higher plants. Warington(42-44) has studied the interrelationships between vanadium and other microelements in the nutrition of soybean, flax, oats, and peas, and has shown that there is an increase in the toxicity of molybdenum with an increase of vanadium, especially in soybean and flax, at least when using solutions of $VOCl_2$ up to 10 ppm. Mazé and Mazé(45) indicated that vanadium was favorable to corn, but did not prove that it was a necessary nutrient element for good growth in that plant.

Our studies of the effect of vanadium salts on the growth of microorganisms and the higher plants started with the work of

41. Ter Meulen, H. Sur la repartition du molybdene dans la nature. Rec. Trav. Chim. Pays-Bas 50: 491-504. 1931.

42. Warington, Katherine. Some interrelationships between manganese, molybdenum and vanadium in the nutrition of soybean, flax and oats. Ann. Appl. Biol. 38: 624-641. 1951.

43. Warington, K. The influence of iron supply on toxic effects of manganese, molybdenum and vanadium on soybean, peas and flax. Ann. Appl. Biol. 41: 1-22. 1954.

44. Warington, K. Investigations regarding the nature of the interaction between iron and molybdenum or vanadium in nutrient solutions with and without a growing plant. Ann. Appl. Biol. 44: 535-546. 1956.

45. Mazé, P. and Mazé, P. J. Recherches sur la nutrition minerale des végétaux superiéurs. Compt. Rend. Soc. Biol. 132: 375-377. 1939.

Witz and Osmond in 1886(46). The concensus of opinion from the investigations up to date is that vanadium in concentrations up to 10 to 20 ppm. seems to be stimulatory, whereas higher concentrations prove toxic to most higher plants. Cleome ornithopodioides Linn. seems to be one of the higher plants which not only can tolerate high concentrations of vanadium in the soil, but which seems to need vanadium to grow properly. It will be of interest to note what other plants move in on the vanadium-slag pile in Canton.

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46. Witz, G. and Osmond, F. Essai sur l'application des propriétés de l'oxycellulose au dosage du vanadium. Bull. Soc. Chim. Paris 45: 309-314. 1886.

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BOOK REVIEWS

Alma L. Moldenke

"Orchids of the Western Great Lakes Region", by Frederick W. Case Jr., xii + 148 pp., illustr. Cranbrook Institute of Science, Bloomfield Hills, Michigan. 1964. $7.00

The Cranbrook Institute has rendered another valuable service to science in publishing this attractive, useful and accurate survey by an author who has carried on years of devoted field work, systematics, and culture studies to these fascinating plants.

The book begins with a brief description of the Orchidaceae, an ecological explanation with a plea for conservation, a detailed treatment of the nine typical habitats of this region, each with species lists, and methods of growing orchids. "At present the Great Lakes region is especially favorable to orchids because of its geographic position, its lake-influenced climate, its soil types, and its glacial history. Fifty-one orchid species grow in the region, besides a number of distinct varieties within the species and a number of hybrids. This region surpasses all others in temperate North America, except neighboring New England, in the number of its orchid species. Yet not one of these species is indigenous to the region. With the possible exception of a very few species in the unglaciated driftless area of Wisconsin, all of our orchids have migrated from other regions since Pleistocene glaciation about 10,000 years ago."

The book continues with excellent keys to genera, with descriptive text for each. Then there are clear cut keys to each species, each illustrated with critical line drawings and each described ac-

cording to habit, season, habitat and distribution. These keys would certainly offer no difficulty to any amateur. Also for each species the author provides either an exquisite color photograph or very fine black and white ones, all in natural habitat, and geographic distribution maps.

What a wonderful aid this book would be for a field trip in this area, or even just an armchair tour!

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"The Gardener's Fern Book", by F. Gordon Foster, xiv + 226 pp., illustr. D. van Nostrand Company, Princeton, New Jersey. 1964. $7.95

Here is another fine book for the amateur naturalist, indoor and outdoor garden hobbyist and horticulturist (May their tribe increase so that our sojourn on this earth may be more happily satisfying and the need for the conservation of our diminishing natural resources be better understood!). It is written and illustrated with excellent color and black and white plates and many helpful line drawings by a learned fern lover who is professionally an engineer. The contents include (1) getting acquainted with ferns, with good suggestions for keeping records, (2) ferns through the ages, with a plea for conservation by suitable transplanting to counteract the havoc of the plow and bulldozer, (3) structural and functional descriptions of all parts and stages of ferns, (4) easy steps to identification, with some helpful derivations of scientific classification terms, (5) simple culturing of hardy ferns for the purpose of growing them in home gardens, woodland plantings and indoors, (6) methods of fern propagation, with a set of excellent diagrams, and (7) occupying the bulk of the book, forty hardy and twenty-seven tender ferns described critically and then generally as to growth conditions and appearances, sori, culture and range. There are full page drawings for each one. The book ends with four useful features — comparative charts, glossary, list of commercial growers, and index.

The specific name of Matteuccia pensylvanica is capitalized on page 63, but, fortunately, is lowercased in the remainder of the text.

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LOBARIA QUERCIZANS MICHX. ON THE COASTAL PLAIN AND PIEDMONT PLATEAU IN MARYLAND AND VIRGINIA

Clyde F. Reed

In 1957, Hale[1/] reviewed our knowledge regarding the distribution of the Lobaria amplissima-L. quercizans complex in Europe and North America, stating that "L. quercizans in North America, has a typical Appalachian-Great Lakes distribution pattern, where it is most abundant in mature conifer-hardwood forests with Lobaria pulmonaria." His accompanying map indicates localities from Newfoundland and Nova Scotia, through New England and Pennsylvania into the Blue Ridge region of Maryland, Virginia, North Carolina, South Carolina into Georgia and Alabama; then westward. There are no localities indicated for regions east or south of the Fall Line (geological divide between the Piedmont Plateau and the Coastal Plain).

The following specimens of Lobaria quercizans Michx. represent collections of this species from the Coastal Plain areas of Maryland, the Delmarva Peninsula and Tidewater Virginia, and from the outer areas of the Piedmont Plateau in Maryland and Virginia.

Maryland: Anne Arundel Co.: Base of tree trunk, Bent Oak near Benfield, near Head of Severn River. Dec. 16, 1915. C.C. Plitt (Reed Herb.). In this region is also found one of the state's rare areas for the Climbing Fern (Lygodium palmatum (Bernh.) Sw.) and Schweinitzia (Monotropsis odorata Ell.). Lobaria pulmonaria (L.) Hoffm. was also collected near here: On tree trunk between Benfield and Odenton. Mar. 24, 1906. C.C. Plitt 37 (USNFC and Reed Herb.). Baltimore Co.: On base of tree, Middle River Neck. Dec. 30, 1905. C.C.Plitt. (USNFC); on tree in ravine near Camp Run. Oct. 3, 1905. C.C.Plitt 1 (USNFC). This area is northeast of Baltimore, very near the Chesapeake Bay. Middle River is a tidal river on the Coastal Plain of Baltimore County, the river lying between the Gunpowder River and the Patapsco River. Dorchester Co.: Low woods along Rt. US #50, on oak, just N of Salem. April 12, 1963. C.F.Reed 61785. This area lies just west of the Nanticoke River.

Virginia: Nansemond Co.: At base of oaks in low woods, Rt. 632, off Rt. US #460, near Myrtle. April 16, 1963. C.F.Reed 61924. This area is just west of the Dismal Swamp.

1/ Hale, Mason E., Jr. Bryologist 60(1): 35-39, map. 1957.

On the edge of the Piedmont Plateau, the following specimens of Lobaria quercizans Michx. and Lobaria pulmonaria (L.) Hoffm. may be recorded.

Maryland: Baltimore Co.: Lobaria quercizans, on trunk of sycamore tree, along Gunpowder Falls. July 16, 1910. C.C.Plitt (Reed Herb.). Actually, the Coastal soils extend from the Gunpowder River along the confluence of the Little and Big Gunpowder Falls. Above the Fall Line, the slopes of the Gunpowders are Piedmont, but the areas along the "falls" have been the pathways for many Coastal species to find their way up to the Piedmont, near Towson (some 8 to 10 miles, and over 400 ft. elevation, to the west). By this same route, some Piedmont flora has come down the Gunpowder Falls nearly to the Gunpowder River, as Pellaea atropurpurea (L.) Link, for example. Lobaria pulmonaria, on tree trunk on road to Dolfields. Aug. 5, 1911. C.C.Plitt (USNFC and Reed Herb.). This area is to the northwest of Baltimore City, not too far from the Patapsco River and the Soldiers Delight area.

Virginia: Charlotte Co.: Lobaria pulmonaria, on hickory, 2 mi. W of Keysville, Virginia Rt. #40. Oct. 27, 1962. C.F.Reed 59722.

The specimens cited above have been identified or verified by Dr. Mason Hale. They extend our known range for these species east and southward on to the Coastal Plain in Maryland and Virginia. Because there are so few specimens from these regions, it seems valuable to record them in the hopes these species will be looked for more deligently. In my studies of the Flora of Delmarva and Tidewater Virginia, these lichens add another group of species usually found on the Piedmont Plateau or on the Appalachians which have distributions on the Coastal Plain. Over 450 species of plants may now be recorded from isolated 'islands' on the Coastal Plain which are otherwise known to be Piedmont and Appalachian species.

MATERIALS TOWARD A MONOGRAPH OF THE GENUS VERBENA. XXIX

Harold N. Moldenke

VERBENA L.

Additional synonymy: Canadea Patermann, Beitr. Zytol. Verbenac. 13, 43, & [54], pl. 1, fig. 1 & 2. 1935.

Additional & emended bibliography: Rüling, Ord. Nat. Pl. 56. 1774; L. C. Rich., Act. Soc. Hist. Nat. Paris 1: 105. 1792; Ann. Mus. Hist. Nat. Paris 15: pl. 14, fig. 1—5. 1810; Kunth, Ind. Sem. Hort. Berol. 1845: 7. 1845; Clos, Ann. Sci. Nat., ser. 3, 10: 378—381. 1848; Schlecht., Ann. Sci. Nat., ser. 3, 14: 342—344. 1850; Schlecht., Linnaea 23: 714—722. 1850; R. A. Phil., Anal. Univ. Chil. 35: 190—192. 1870; Jönsson, Bot. Notiser 6: 169—187. 1881; Gilland, Rev. Hortic. 53: 348. 1881; Hieron., Bol. Acad. Nac. Córdoba 4: 407—409. 1881; Hieron., Pl. Diaph. Fl. Argent. 213—215. 1882; Cockerell, Canad. Ent. 28: 158. 1896; Cockerell & Porter, Ann. Mag. Nat. Hist. (7) 4: 412. 1899; Cockerell & Atkins, Ann. Mag. Nat. Hist. (7): 10: 44. 1902; Crawford, Canad. Ent. 34: 240. 1902; Charany, Journ. de Chim., ser. 7, 2: 292—298. 1910; Lond. Chem. Soc. Journ. 98: 991. 1910; Chem. Abstr. 5: 2525. 1911; Robertson, Ent. News 25: 72. 1914; Rau & Rau, Journ. Anim. Behavior 6: 368. 1916; Alvarez, Fl. Santiago del Estero 106. 1919; Kanda, Bot. Gaz. 69: 54—71, pl. 6—9. 1920; Robertson, Psyche 29: 171. 1922; Rau, Trans. Acad. Sci. St. Louis 24 (7): 22. 1922; Schnarf, Ost. Bot. Zeitschr. 74: 40—45. 1925; Schnarf in Linsb., Handb. Pflanzenanat. 10 (2): 64, 123, 233, 345, 380, & 688. 1929; Schwencke, Zytol. Untersuch. Verbenac. 3—15, 17—27, & 31. 1931; Patermann, Beitr. Zytol. Verbenac. 6—8, 10, 13—14, 43, 47, & [54], pl. 1, fig. 1 & 2. 1935; Bider, Beitr. Pharmakog. Borag. 95—100 & 120, pl. 7, fig. 1. 1935; Oppenheimer & Evenari, Bull. Soc. Bot. Genèv. 31: 363. 1941; Oppenheimer & Evenari, Florul. Cisiord. 363. 1948; Parks & King, El Crisol [Puerto Rico] 4: 74—80. 1950; Chem. Abstr. 45: 3037. 1951; Muesebeck, Krombein, & Townes, U. S. Dept. Agr. Agric. Monog. 2 [Hymenop. N. Am.]. 1951; H. C. Greene, Am. Midl. Nat. 48: 37—54. 1952; H. C. Greene, Biol. Abstr. 27: 1885. 1953; Acevedo de Vargas, Rev. Chil. Hist. Nat. 54: 45. 1954; Moldenke, Biol. Abstr. 27: 984, 2026, & 3121. 1953; Spector, Handb. Biolog. Data 186, 394, 395, & 508. 1956; Santapau, Fl. Purandhar 103, 104, & 158. 1957; Algonquin Prov. Park Mus. Check-list 19. 1957; Muñoz Pizarro, Sin. Fl. Chil. 199—200, pl. 96 c—e & 97. 1959; Reitz, Sellowia 11: 45, 57, 79, & 134—135 (1959) and 12: 152 & 157. 1960; G. Rzedowski, Act. Cientif. Potos. 4: 65 & 91. 1960; T. B. Mitchell, Bees East. U. S. [N. C. Agr. Exp. Sta. Tech. Bull. 141]: 292. 1960; M. L. Buch, U. S. Dept. Agr. Agric. Handb. 64: 13. 1960; Muñoz Pizarro, Espec. Plant. Descr. Philippi 110—111. 1960; Anon., Billie Bear Plant List 8. 1961; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 143—144. 1961; Irwin, Roadside Flow. Tex. 189—190,

pl. 39. 1961; Hatusima, Mem. South. Indust. Sci. Inst. Kagoshima Univ. 3 (1): 31 & 3 (2): 143. 1962; Buchi & Manning, Tetrahedron 18: 1049--1059. 1962; D. B. Ward, Rhodora 64: 91. 1962; T. Mey., Op. Lill. 10: 50 & 65. 1963; Pinkava, Ohio Journ. Sci. 63: 125. 1963; Taylor & Hamblin, Handb. Wild Fl. Cult. 168--169, 257, 267, 279, & 294. 1963; Buchi & Manning, Biol. Abstr. 41: B.105. 1963; Harborne in T. Swain, Chem. Pl. Tax. 372. 1963; Steyerm., Fl. Mo. 1257--1261, pl. 302 & 303. 1963; Shelford, Ecol. N. Am. 77 & 607. 1963; G. N. Jones, Am. Midl. Nat. Monog. 7: [Fl. Ill., ed. 3] 212--213 & 400. 1963; Sharma & Mukhopadhyay, Journ. Genet. 58: 358--360, 372, 376--380, & 384, pl. 12, fig. 53 & 54. 1963; Moldenke, Phytologia 8: 460--496 (1963), 9: 351--407 (1963), 10: 89, 91--115, 117--125, 127--143, 145--155, 157--161, & 490--504 (1964), and 11: 1--68 & 72, fig. 13 & 14. 1964; A. & I. Nehrling, Pict. Book Perenn. 130--131 & 286. 1964; Shinners, Sida 1: 298. 1964; Moldenke, Biol. Abstr. 45: 8025, B.126, B.127, B.129, & B.131. 1964; Langman, Select. Guide Lit. Glow. Pl. Mex. 208, 329, 515--517, 580, 680, 748, & 1010. 1964; Menninger, Seaside Pl. 35, 51, 54, 98, 265, 269, & 302. 1964; Soukup, Biota 5: 42, 52, 115, & 134--135. 1964; Moldenke, Résumé Suppl. 10: 1, 2, 4, & 7 (1964) and 11: 1--8. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1235--1246, 1251, & 1738--1739. 1964; A. L. Moldenke, Phytologia 10: 166 & 238. 1964; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1963: 60. 1964; Punt, Reg. Veg. 36: 36. 1964; Henry & Buker, Trillia 12: 89, 125, & 132. 1964; Anon., Herald Statesman, Yonkers, N. Y., p. 27, Nov. 19. 1964; Hocking, Excerpt. Bot. A.7: 454--456. 1964; Anon., Biol. Abstr. 46 (2): B.130. 1965; Moldenke, Phytologia 11: 219--286, 290--357, & 400--422. 1965; Anon., Time 85 (5): 42. 1965; Anon., N. Y. Herald Trib., sect. 2, p. 19, Feb. 7, 1965.

Addenda to list of excluded species:

Verbena suffruticosa reclinata foliis angustis serrato-dentato, pedunculis longis solitariis, floribus conglobatis P. Br. = Phyla stoechadifolia (L.) Small

Verbena undulata Reitz = Lantana undulata Schrank

Addenda to list of abbreviations employed for the names of herbaria whose material is cited:

Cd = Museo de Córdoba, Córdoba, Argentina
Fj = Fred B. Jones Herbarium, Corpus Christi, Texas
Ij = Science Museum, Institute of Jamaica, Kingston, Jamaica
Lb = University of Missouri, Columbia, Missouri
Sj = University of Puerto Rico, San Juan, Puerto Rico
Ww = Rob and Bessie Welder Wildlife Foundation, Corpus Christi, Texas

Rüling (1774) brackets Verbena and Phryma together and says "Verbena Ringentes et Verticillatas coniungit". He seems to regard Verbena, however, as a member of his "Ordo" Ringentes, Section Pediculares. In Alvarez (1919) the generic name is in some places uppercased and in some places lowercased.

Muesebeck, Krombein, & Townes (1951) report that the genus Ver-

bena is regularly and apparently exclusively visited by the bees Calliopsis hirsutifrons Cockerell [C. verbenae Cockerell & Porter] and C. nebraskensis Crawford [C. verbenae var. nebraskensis Crawford].

Soukup (1964) records the common names "azulina", "huallkjapaya", "huayñu-huayta", "maycha", "sandia lagüen", and "tacpa". He says "El cocimiento se emplea para lavar úlceras de mal carácter, en tratamiento de la terciana; la cataplasma de las hojas en la supuración del hígado, los polvos bebidos en vino añejo en tratamiento de ictericia, el cocimiento con sal y limón, se toma como purgante; el cocimiento en enjuagatorios en el dolor de muelas; el cocimiento en enemas, en el tratamiento de la fiebra tifoidea, el cocimiento se toma en la colerina, como febrífugo y en enemas como desirritante." It is said that the Pawnee Amerinds brewed a tea from Verbena flowers which they called "pleasant-dream-drink" and apparently used it to quiet nerves and induce sleep. This may have been the first tranquilizer used in North America!

Spector (1956) says that this is one of fifty plants that are host in North America and Europe to the chrysanthemum nematode (Aphelenchoides ritzema-bosi), which is a vagrant endoparasite of the buds and foliage. The symptoms are crumpled distorted leaves and leaf spots. Control consists of hot water treatment of the dormant plants, as well as parathion sprays. He also reports that many species of this genus are severly injured by relatively low concentrations of 2,4-D, only slightly depending on the species involved.

VERBENA ABRAMSI Moldenke

Additional bibliography: Moldenke, Phytologia 10: 91 & 140 (1964) and 11: 105. 1964.

xVERBENA ADULTERINA Hausskn.

Additional bibliography: Moldenke, Phytologia 10: 91, 210, 212, & 219. 1964.

VERBENA ALATA Sweet

Additional bibliography: Reitz, Sellowia 13: 67 & 110. 1961; Moldenke, Phytologia 10: 91, 122, & 160 (1964) and 11: 121. 1964.

VERBENA AMBROSIFOLIA Rydb.

Additional bibliography: Moldenke, Résumé Suppl. 10: 2 (1964) and 11: 2. 1964; Moldenke, Phytologia 10: 91--92 (1964), 11: 32, 43, & 48 (1964), and 11: 273, 290, & 326. 1965.

Jackson reports this species as very abundant along roadsides in Guadalupe County, New Mexico. The Tharp & Janszen 49-1140 distributed as this species is actually V. wrightii A. Gray. D. B. Dunn 3050 is a mixture with V. bipinnatifida var. latilobata Perry.

Additional citations: KANSAS: Douglas Co.: Wilson & Miller s.n. [6-15-12] (Lw). Linn Co.: B. F. Bush 15503 (Lb--23431). OKLAHOMA: Logan Co.: Gephardt 940 (W--2421207). TEXAS: Culberson Co.: Tharp

& Janszen 49-1169 (Lw). NEW MEXICO: Guadalupe Co.: S. W. Jackson 12-1 (Lw). San Miguel Co.: D. B. Dunn 6595 (Lb--41601). Socorro Co.: D. B. Dunn 3050, in part (Lb--48431).

VERBENA ARAUCANA R. A. Phil.

Additional bibliography: Muñoz Pizarro, Espec. Plant. Descr. Philippi 110. 1960; Moldenke, Phytologia 10: 93 (1964) and 11: 58. 1964.

The Macbride photograph 17400, cited below, is of a specimen that was deposited in the herbarium of the Botanisches Museum at Berlin, now destroyed.

Additional citations: CHILE: Linares: R. A. Philippi s.n. [Linares; Macbride photos 17400] (N--photo).

VERBENA ARISTIGERA S. Moore

Additional bibliography: Moldenke, Phytologia 10: 93 (1964) and 11: 284 & 290. 1965.

VERBENA ATACAMENSIS Reiche

Additional bibliography: Moldenke, Phytologia 10: 93 (1964) and 11: 245. 1965.

xVERBENA BAILEYANA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 93 & 210. 1964.

VERBENA BAJACALIFORNICA Moldenke

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1245. 1964; Moldenke, Phytologia 11: 32. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 516. 1964.

VERBENA BALANSAE Briq.

Additional bibliography: Reitz, Sellowia 11: 57 & 134 (1959) and 13: 67 & 110. 1961; Moldenke, Phytologia 10: 93 (1964) and 11: 312 & 313. 1965.

VERBENA BARBATA Grah.

Additional bibliography: Moldenke, Phytologia 10: 93. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 329 & 1010. 1964.

VERBENA BERTERII (Meisn.) Schau.

Additional synonymy: Glandularia berteroi Muñoz Pizarro, Sin. Fl. Chil. 199 & 200, pl. 97. 1959.

Additional bibliography: Muñoz Pizarro, Sin. Fl. Chil. 199 & 200, pl. 97. 1959; Moldenke, Phytologia 10: 93--94 (1964), 11: 51, 52, 188, & 189 (1964), and 11: 245 & 246. 1965.

Additional illustrations: Muñoz Pizarro, Sin. Fl. Chil. pl. 97. 1959.

It should be noted here that the Macbride photograph 7853, cited below, is a photograph of two specimens in the Delessert Herbarium at the Conservatoire et Jardin Botaniques in Geneva.

Additional citations: CHILE: Colchagua: Bertero 744 [Macbride

photos 7853, in part] (N--photo of isotype). Valparaíso: Bertero 1389 [Macbride photos 7853, in part] (N--photo).

VERBENA BIPINNATIFIDA Nutt.

Additional synonymy: Verbena bipinnatifidia Nutt. ex Moldenke, Résumé Suppl. 10: 7, in syn. 1964.

Additional bibliography: Irwin, Roadside Flow. Tex. 189, pl. 39. 1961; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 143. 1961; Steyerm., Fl. Mo. 1257, 1261--1263, map 1846, pl. 303, fig. 3. 1963; Moldenke, Résumé Suppl. 10: 1 & 7 (1964) and 11: 4. 1964; Moldenke, Phytologia 10: 94--95, 217, 282--284, 306, & 307 (1964), 11: 13, 25, 32, 41, 43, 47, & 48 (1964), and 11: 290, 308, & 326. 1965.

Additional illustrations: Irwin, Roadside Flow. Tex. pl. 39 [in color]. 1961; Steyerm., Fl. Mo. pl. 303, fig. 3. 1963.

The species has been found by recent collectors in pasture openings and dry rocky prairie ravines, exposed areas of dry prairie hillsides, in calcareous or clay loam soil, sandy soil of roadsides, sandy loam over caliche, chalky soil of roadside waste places, and dry sandy soil along the edges of roadside embankments, along sandy fencerows, trails in shortgrass grasslands, and dry caliche rocky roadsides, on slopes and dry prairie slopes, road shoulders, dry rocky or open rolling prairies, exposed roadcuts in chalky soil, rolling buffalograss prairies, prairie bluffs and limestone outcrops of steep prairie bluffs, overgrazed grasslands, rocky and dry prairie hillsides, rocky ridges with Buchloë, caliche outcrops, and prairies along the edges of chalky banks. An additional common name is "prairie verbena".

The corolla is described as "blue" on Horr 4766 & 4775, "bluish-purple" on Harms 1758, and "reddish to purple" on McGregor 5678.

In Oklahoma the plant was found by McGregor on rocky prairies in Murray County. In Texas Harms found it abundant along fencerows and in red chalky loam in Kent County and "locally numerous" in grassy roadsides in Baylor County. In Kansas it was reported by Wagenknecht as "common in ditches and dry disturbed soil along roads through prairie hillsides" in Ellsworth County; Morley found it growing in thin loam soil over limestone, scattered along roadsides and common on grazed prairie pastures in Republic County; Hulbert found it scattered in upland grasslands in Morton County and sparse on eroded gravelly banks in grassland in Russell County. It is described by Ireland as common on the prairie in Wabaunsee County. McGregor found it "in scattered patches on mixed grass prairie hillslopes" in Osborne, scattered in fencerows, in red gypsum soil of rough dissected prairie, and in shortgrass association in Hodgeman, scattered on prairie hillsides in Trego, scattered on prairie slopes in Rooks, common on open banks in rough gypsum prairies, common in red gypsum soil of rolling prairies, and scattered colonies in red gypsum soil of prairies in Barber County. The same collector reports the species as common in barren places in overgrazed prairies in Morton, scattered in overgrazed places in bottom of prairie ravines in Scott, scattered in open places of

rocky prairies in Russell, common on rocky prairie hillsides in Ford, and scattered patches on rocky prairie hillsides in Jewell County. He also reports it as scattered on sandy plains in Logan, common on banks and in open places in Rooks, "scattered colonies on rocky prairie hillsides" in Pottawatomie, "in scattered colonies at edge of buffalograss prairies" in Russell, and "plants in scattered clones [sic] on rocky prairie hillsides" in Hodgeman County.

Horr says that the species is "common all over Meade County", in dry loam wasteland and "common" in dry loam grassland in Russell, "common throughout Clark County", in dry sandy loam of grassland and "scattered in dry loam of grassland" in Clark and Jewell Counties, "scattered" in dry calcareous loam of chalk cliffs in grassland in Phillips, and "scattered in dry loam of overgrazed grassland" in Rooks County. Horr & Horr report it common but not plentiful in dry loam of grassland and wasteland in Trego County, while Horr & McGregor describe it as common in dry sand of roadside ditches in Kiowa County.

The D. B. Dunn 3050 (in part) & 6595, S. W. Jackson 12-1, and Wilson & Miller s.n. [6-15-12], distributed as V. bipinnatifida, are actually V. ambrosifolia Rydb.; D. B. Dunn 3050 (in part), 3267, & 6375 are V. bipinnatifida var. latilobata Perry; Hulbert 3572 & 3581, E. L. Richards 2533, and Wagenknecht 3094 & 4345 are V. bracteata Lag. & Rodr.; Wagenknecht 2605 & 3529 are V. canadensis (L.) Britton; D. B. Dunn 3039, 3276, & 6445, Dunn & Levine 3439, and Dunn & Lint 4384 are V. ciliata Benth.; C. M. Rowell 4702 is V. ciliata var. longidentata Perry; and D. B. Dunn 3081 and Wagenknecht 4754 are V. wrightii A. Gray, while the F. B. Jones 1867, distributed as "prob. albino of V. bipinnatifida" is V. ciliata Benth.

Additional citations: KANSAS: Barber Co.: E. W. Lathrop 2241 (Lw); R. L. McGregor 10665 (Lw), 12211 (Lw), 14024 (Lw), 14237 (Lw), 14876 (Lw); E. L. Richards 3715 (Lw); B. L. Wagenknecht 2438 (Lw). Clark Co.: W. H. Horr 3305 (Lw), 4459 (Lw). Ellis Co.: R. L. McGregor 9308 (Lw); H. Shepherd 83 (Lb—33197). Ellsworth Co.: R. L. McGregor 9261 (Lw); B. L. Wagenknecht 2501 (Lw). Ford Co.: R. L. McGregor 10917 (Lw). Gove Co.: Hulbert 3535 (Lb—50383, Lw). Hodgman Co.: R. L. McGregor 4601 (Lw), 5181 (Lw), 10598 (Lw, Lw). Jewell Co.: W. H. Horr 4368 (Lw), 7775 (Lw); R. L. McGregor 7369 (Lw). Kiowa Co.: Horr & McGregor 3809 (Lw). Logan Co.: R. L. McGregor 17251 (Lw). Meade Co.: W. H. Horr 3448 (Lw). Morton Co.: Hulbert 3582 (Lb—50494, Lw); R. L. McGregor 12953 (Lw). Norton Co.: E. L. Richards 2761 (Lw). Osborne Co.: R. L. McGregor 7425 (Lw). Phillips Co.: W. H. Horr 4766 (Lw); R. L. McGregor 9533 (Lw); E. L. Richards 2744 (Lw). Pottawatomie Co.: R. L. McGregor 12288 (Lw). Republic Co.: G. E. Morley 278 (Lw). Rooks Co.: V. L. Harms 1307 (Lw); W. H. Horr 4983 (Lw); R. L. Mc

Gregor 9575 (Lw), 12452 (Lw). Russell Co.: V. L. Harms 923 (Lw); W. H. Horr 4921 (Lw); Hulbert 3470 (Lw); R. L. McGregor 5678 (Lw), 9295 (Lw), 12410 (Lw); E. L. Richards 365 (Lw). Scott Co.: Fearing & Latham s.n. [August 14, 1950] (Lw); R. L. McGregor 13007 (Lw). Smith Co.: W. H. Horr E.108 (Lw, Lw); E. L. Richards 2889 (Lw). Trego Co.: V. L. Harms 973 (Lw); Horr & Horr 4208 (Lw); R. L. McGregor 9345 (Lw), 17142 (Lw); E. L. Richards 411 (Lw). Wabaunsee Co.: Ireland 71 (Lw). OKLAHOMA: Murray Co.: R. L. McGregor 15015 (Lw). TEXAS: Baylor Co.: V. L. Harms 1737 (Lw). Kent Co.: V. L. Harms 1758 (Lw). Nueces Co.: F. B. Jones 1718a (Ww). San Patricio Co.: F. B. Jones 2838 (Fj), 4485 (Ww), 4523 (Ww), 4904 (Ww). Travis Co.: M. Pearce s.n. [Austin, April 1932] (Lb--27597). NEW MEXICO: Catron Co.: Norris & Zweifel s.n. [9-4-48] (Lb--43843).

VERBENA BIPINNATIFIDA var. LATILOBATA Perry

Additional bibliography: Moldenke, Résumé Suppl. 11: 4. 1964; Moldenke, Phytologia 10: 92, 95, & 98 (1964) and 11: 326. 1965.

Additional citations: NEW MEXICO: Otero Co.: D. B. Dunn 3267 (Lb--48458). Socorro Co.: D. B. Dunn 3050, in part (Lb--48400). Torrance Co.: D. B. Dunn 6375 (Lb--41689).

xVERBENA BLANCHARDI Moldenke

Additional bibliography: G. N. Jones, Am. Midl. Nat. Monog. 7: [Fl. Ill., ed. 3] 213. 1963; Moldenke, Phytologia 10: 95, 155, 164, & 180. 1964; Moldenke, Résumé Suppl. 10: 1. 1964.

The E. W. Lathrop 369 collection is a mixture with V. canadensis (L.) Britton. W. H. Horr 4436, 4648, & 4697, distributed as xV. blanchardi, are actually V. hastata L.

The hybrid has been found in overgrazed prairie pastures and in prairie pastures with limestone rock surfacing, flowering in May.

Additional citations: KANSAS: Woodson Co.: E. W. Lathrop 369, in part (Lw), 488 (Lw).

VERBENA BONARIENSIS L.

Additional synonymy: Verbena bonaeiriensis L. ex Alvarez, Fl. Santiago del Estero 106, sphalm. 1919. Verbena banariensis L. ex Moldenke, Résumé Suppl. 10: 7, in syn. 1964.

Additional literature: Ann. Mus. Hist. Nat. Paris 15: pl. 14, fig. 4. 1810; R. A. Phil., Anal. Univ. Chil. 35: 192. 1870; Alvarez, Fl. Santiago del Estero 106. 1919; Augusto, Fl. Rio Grande do Sul 235. 1946; Reitz, Sellowia 11: 57 & 134. 1959; Moldenke, Résumé Suppl. 10: 7 (1964) and 11: 4. 1964; A. & I. Nehrling, Pict. Book Perenn. 131. 1964; Moldenke, Phytologia 10: 95, 125, 160, 291, & 498 (1964) and 11: 41, 62, 63, 84--86, 88, 98, 99, & 183 (1964), and 11: 336 & 341. 1965.

An additional common name recorded for this species is "sangre

de Cristo", but this name is also applied to V. litoralis H.B.K. and to V. peruviana (L.) Britton.

The Bracelin 1512 & 2827, distributed as V. bonariensis, are actually var. conglomerata Briq., while Beamer s.n. [April 30, 1953], Demaree 15103, Glaziou 6048, and S. M. Tracy 8706 are V. brasiliensis Vell.

Additional citations: ARKANSAS: Drew Co.: Demaree 23251 (Lb—46746). PUERTO RICO: Alain 10365 (G, Ij, N, Sj, Z, Z). BRAZIL: Guanabara: Boechat 22 (Ja); Palacios, Balegno, & Cuezzo 4017a (Ja—54403), 4020 (Ja—54405). Minas Gerais: Duarte & Graziola 7864 (N). Rio de Janeiro: Lanna Soti 12 (Ja, Z).

VERBENA BONARIENSIS var. CONGLOMERATA Briq.

Additional bibliography: Moldenke, Phytologia 10: 95. 1964.

This plant has been collected in fruit in December.

Additional citations: CULTIVATED: California: Bracelin 1512 (N), 2827 (N).

VERBENA BRACTEATA Lag. & Rodr.

Additional bibliography: Spector, Handb. Biolog. Data 394. 1956; G. N. Jones, Am. Midl. Nat. Monog. 7: [Fl. Ill., ed. 3] 213. 1963; Steyerm., Fl. Mo. 1257--1261, map 1844, pl. 302, fig. 3. 1963; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1242. 1964; Moldenke, Résumé Suppl. 10: 1 (1964) and 11: 1--4. 1964; A. L. Moldenke, Phytologia 10: 166. 1964; Punt, Reg. Veg. 36: 36. 1964; Moldenke, Phytologia 10: 96, 140, 141, 152, 154, 155, 186, 210, & 307--311 (1964) and 11: 13, 28—30, 32--34, 43, 86, 103—105, 113, 116, 117, 163, 165, 198, 200, 202, & 203 (1964), and 11: 241. 1965.

Additional illustrations: Steyerm., Fl. Mo. pl. 302, fig. 3. 1963.

Spector (1956) reports that this species can be killed by relatively low concentrations of at least one formation of 2,4-D.

Recent collectors have found the plant growing in sandy and dry sandy areas, limestone ground, pastures and open barren areas in pastures, overgrazed areas, waste places along railroad tracks, sandy soil of waste areas or waste places, sandy clay loam soil, loam or rich loam with fair soil moisture, dry rocky clay soil in schoolyards, talus at base of chalk cliffs, roadside waste land, overgrazed prairies, thickets along roadsides, bare open places, breaks along rivers, and rocky soil on creek bottoms with Euphorbia, on roadside banks and clay ravine banks, prairies, the bottoms of dried ponds, banks of stationery sand dunes, railroad ballast and embankments, and sandy flood flats, as well as the edge od thickets near creeks, the edge of fields and cultivated fields, the edge of prairies, and the edge of roadsides in dry sandy arid rangeland, and along cattle trails in shortgrass association.

Poindexter 18 bears a notation to the effect that its chromosome count was n = 7. Unger found V. bracteata "rare and scatter-

ed in grazed sandy areas" in Stafford County; Lathrop encountered it in overgrazed prairie pastures with limestone rock surfacing in Woodson County; while Wagenknecht found it in dry clay soil in badly eroded areas at the base of river bluffs in Doniphan, scattered throughout rolling sandy prairie pastures in Stafford, and common at the edges of sand dunes in rangeland in Reno County, Kansas. It is described by Hulbert as "scattered in upland grasslands" in Morton, "scarce on sandy hills" in Grant, "frequent in loam soil of weedy pastures" in Wichita, "local patches in sloping upland in native grassland" in Rawlins, and "sparse on eroded gravelly banks in grasslands" in Russell County. Horr informs us that it is "scattered in wet loam of floodland" in Meade, "common in dry loam of grasslands" in Ford, "common in dry clay of grasslands" in Marion, "common in dry loam of overgrazed grasslands" in Marshall, "scattered in dry loam of roadsides" in Smith, "common in dry loam and clay of roadsides, waste land, and pastures" in Coffey, and "common in dry sand of waste land" in Meade County. It is described by McGregor as "scattered along roadsides" in Kiowa, "abundant in open places" in Logan, "common at edge of fields" in Montgomery, "common in local areas on sandy floodplains" in Cheyenne, "abundant in disturbed roadside areas" in Decatur, and "common in red gypsum soil of prairies and scattered on roadside banks" in Barber County. He also states in regard to his no. 7331 "plants prostrate or only with a few of the branches slightly erect. Was growing with an erect form of the species represented by my number 7330" — and for his no. 7330 he says "Several of these plants were found which grew erect and not at all the habit of the species. Typical plants were also present."

The corolla is described as "blue" on Horr 4569 & 4772. An additional common name is "low vervain". The Norris & Zweifel s.n. [9-4-48], distributed as V. bracteata, is actually V. bipinnatifida Nutt., while Dalke s.n. [9.10.39] is V. canadensis (L.) Britton.

Steyermark (1963) records this species from Andrew, Barry, Carroll, Cass, Clark, Clinton, Cole, Crawford, DeKalb, Douglas, Gentry, Harrison, Holt, Howard, Johnson, Laclede, Lafayette, Lawrence, Linn, Livingston, Macon, Madison, Moniteau, New Madrid, Newton, Osage, Ozark, Pettis, Pulaski, Ray, Reynolds, Saint Clair, Saint Francois, Saline, Scott, Stone, Sullivan, Vernon, Washington, and Worth Counties, Missouri, on the basis of specimens in the herbarium of the Missouri Botanical Garden at St. Louis, not as yet seen by me. The Crookshanks 142 which he says "appears to be a hybrid between V. bracteata and V. hastata" is actually xV. perriana Moldenke.

Additional citations: NEW YORK: Rockland Co.: Lehr 1018 (N). INDIANA: Madison Co.: A. R. Moldenke 801 (Lw). IOWA: Cass Co.: H. N. Moldenke 21938 (Lw). Clayton Co.: A. R. Moldenke 992 (Lw). Delaware Co.: A. R. Moldenke 985 (Lw). Iowa Co.: A. R. Moldenke 973 (Lw). Keokuk Co.: A. R. Moldenke 969 (Lw), 970 (Lw). Linn Co.: A. R. Moldenke 978 (Lw). Madison Co.: A. R. Moldenke 944 (Lw). Mahas-

ka Co.: A. R. Moldenke 958 (Lw). Marion Co.: A. R. Moldenke 952 (Lw). Mills Co.: A. R. Moldenke 919 (Lw). Pottawatomie Co.: A. R. Moldenke 921 (Lw), 933 (Lw). Poweshiek Co.: A. R. Moldenke 968 (Lw). Warren Co.: A. R. Moldenke 948 (Lw). Washington Co.: B. L. Wagenknecht 330 (Lw). MICHIGAN: Menominee Co.: A. R. Moldenke 1025 (Lw). Wexford Co.: A. R. Moldenke 1028 (Lw). WISCONSIN: Adams Co.: Rickett s.n. [Friendship, June 24, 1926] (Lb--27608). Dane Co.: A. R. Moldenke 1007 (Lw). Iowa Co.: A. R. Moldenke 1006 (Lw). MINNESOTA: Polk Co.:Terrell 1833 (W--2388720). KANSAS: Allen Co.: A. R. Moldenke 874 (Lw). Anderson Co.: A. R. Moldenke 872 (Lw). Barber Co.: W. H. Horr 3118 (Lw); R. L. McGregor 12865 (Lw), 14766 (Lw), 14913 (Lw). Barton Co.: A. R. Moldenke 896 (Lw). Brown Co.: A. R. Moldenke 911 (Lw). Chautauqua Co.: A. R. Moldenke 884 (Lw). Cheyenne Co.: W. H. Horr 4725 (Lw), 4740 (Lw); R. L. McGregor 13566 (Lw). Cloud Co.: R. L. McGregor 4833 (Lw). Coffey Co.: W. H. Horr 3481 (Lw). Comanche Co.: R. L. McGregor 14669 (Lw). Cowley Co.: A. R. Moldenke 886 (Lw). Decatur Co.: R. L. McGregor 13517 (Lw); E. L. Richards 2844 (Lw). Dickinson Co.: A. R. Moldenke 902 (Lw). Doniphan Co.: W. H. Horr 4301 (Lw); B. L. Wagenknecht 3290 (Lw). Douglas Co.: W. C. Stevens 6719 (Lw). Elk Co.: A. R. Moldenke 876 (Lw). Ellsworth Co.: A. R. Moldenke 898 (Lw); B. L. Wagenknecht 2506 (Lw). Finney Co.: Wilson & Miller s.n. [7-18-12] (Lw). Ford Co.: W. H. Horr 3613 (Lw). Franklin Co.: Hetzer 318 (Lw). Geary Co.: F. C. Gates 19783 (Lb--47720); A. R. Moldenke 903 (Lw). Grant Co.: Hulbert 3572 (Lw). Harper Co.: R. L. McGregor 14697 (Lw). Hodgeman Co.: R. L. McGregor 10616 (Lw). Jefferson Co.: J. Latham 368 (Lw); A. R. Moldenke 904 (Lw). Jewell Co.: W. H. Horr 4394 (Lw). Kingman Co.: R. L. McGregor 7322 (Lw); A. R. Moldenke 893 (Lw). Kiowa Co.: Horr & McGregor 3790 (Lw); R. L. McGregor 15168 (Lw). Leavenworth Co.: E. L. Richards 2670 (Lw). Linn Co.: A. R. Moldenke 870 (Lw). Logan Co.: R. L. McGregor 9409 (Lw). Marion Co.: W. H. Horr 3472 (Lw). Marshall Co.: W. H. Horr 4569 (Lw). Meade Co.: W. H. Horr 3301 (Lw), 3345 (Lw), 3458 (Lw). Montgomery Co.: R. L. McGregor 14594 (Lw). Morris Co.: E. L. Richards 1786 (Lw). Morton Co.: Hulbert 3581 (Lw); E. L. Richards 2455 (Lw), 2533 (Lw). Nemaha Co.: R. L. McGregor 12270 (Lw). Norton Co.: R. L. McGregor 9497 (Lw). Pawnee Co.: B. L. Wagenknecht 4504 (Lw). Pratt Co.: H. N. Moldenke 21928 (Lw). Rawlins Co.: Hulbert 3488 (Lb--50461, Lw); R. L. McGregor 9469 (Lw). Reno Co.: R. L. McGregor 7330 (Lw), 7331 (Lw); B. L. Wagenknecht 3094 (Lw). Republic Co.: G. E. Morley 114 (Lw), 524 (Lw). Rice Co.: E. W. Lathrop 3854 (Lw). Riley Co.: F. C. Gates 12748 (Lb--27596). Russell Co.: Hulbert 3471

(Lw). Saline Co.: A. R. Moldenke 900 (Lw). Sedgwick Co.: W. H. Horr 6719 (Lw). Seward Co.: W. H. Horr 3096 (Lw). Shawnee Co.: Volle 790a (Lw). Smith Co.: W. H. Horr 4772 (Lw). Stafford Co.: Ungar 819 (Lw); B. L. Wagenknecht 4345 (Lw). Stanton Co.: R. L. McGregor 4529 (Lw), 16134 (Lw). Sumner Co.: A. R. Moldenke 888 (Lw). Trego Co.: Horr & Horr 4175 (Lw); J. D. Poindexter 18 (Lw). Wallace Co.: V. L. Harms 1189 (Lw). Wichita Co.: Hulbert 3262 (Lb--50502, Lw). Wilson Co.: R. L. McGregor 15053 (Lw); A. R. Moldenke 875 (Lw). Woodson Co.: E. W. Lathrop 1276 (Lw). Wyandotte Co.: E. L. Richards 3210 (Lw). MISSOURI: Barton Co.: E. J. Palmer 50944 (Lb--50944), 55331 (Lb--50948); Z. Williams s.n. [Lamar, Aug. 1928] (Lb--4166). Bates Co.: A. R. Moldenke 866 (Lw), 892 (Lw). Boone Co.: Daniels s.n. [Columbia, Jul. '97] (Lb--4165); Drouet 791 (Lb--12069), s.n. [Columbia, 8/31/30] (Lb--8502, Lb--8503); Favor s.n. [July 16, 1901] (Lb--4160, Lb--4161); Rickett s.n. [June 29, 1929] (Lb--7104); Van Horn s.n. [Columbia, 7/18/25] (Lb--10944). Dunklin Co.: Steyermark 7934 (Lb--45325). Franklin Co.: J. M. Mason s.n. [Meramec State Park, 7/17/35] (Lb--34370); A. R. Moldenke 845 (Lw). Grundy Co.: Crookshanks 240 (Lb--29745). Henry Co.: A. R. Moldenke 864 (Lw); E. J. Palmer 55829 (Lb--50945). Jackson Co.: B. F. Bush s.n. [6-2-1892] (Lb--4162). Mississippi Co.: R. R. Kincaid s.n. [Sept. 4, 1927] (Lb--4163, Lb--4164). Nodaway Co.: J. R. Singleton 169 (Lb--34593). ARKANSAS: Bradley Co.: Demaree 25503 (Lb--53498). Marion Co.: Demaree 47929 (Lw). Saint Francis Co.: Demaree 47840 (Lw). NEVADA: Clark Co.: Clokey 8096 (Lb--35773, N). COLORADO: Boulder Co.: Daniels 2 (Lb--27601). El Paso Co.: Naylor s.n. [Aug. 19, 1933] (Lb--27600). Huerfano Co.: B. L. Wagenknecht 2903 (Lw). Jefferson Co.: Perdue 4034 (W--2422918). NEBRASKA: Cass Co.: A. R. Moldenke 917 (Lw). Otoe Co.: A. R. Moldenke 961 (Lw). OKLAHOMA: Pawnee Co.: C. F. Coffman s.n. [Pawnee, Aug. 31, 1933] (Lb--14291). NEW MEXICO: Santa Fé Co.: Dunn & Lowe 6485 (Lb--40728). Socorro Co.: D. B. Dunn 4711 (Lb--54401). Torrance Co.: D. B. Dunn 6125 (Lb--38497), 6149 (Lb--38329), 6204 (Lb--38545). CALIFORNIA: San Bernardino Co.: Parish & Parish 2171 (Lb--27692).

VERBENA BRASILIENSIS Vell.

Additional bibliography: Reitz, Sellowia 11: 57 & 134 (1959) and 13: 67 & 110. 1961; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 143. 1961; Moldenke, Phytologia 10: 96--97, 160, 217, 296, & 297. 1964; Moldenke, Résumé Suppl. 10: 1 (1964) and 11: 3 & 86. 1964.

The corolla is described as deep-lavender on Perdue 4153 and as purple on Beamer s.n. [April 30, 1953]. Recent collectors have found the plant in clay of roadside ditches, in clearings

near roadsides, and in clay banks and ditches. F. B. Jones describes it as locally abundant in clay soil along ditches near railroads in San Patricio County, Texas. Demaree calls it "common in flat wet woods" in Arkansas. Material has been misidentified and distributed in herbaria as V. xutha Lehm.

Additional citations: FLORIDA: Escambia Co.: S. M. Tracy 8706 (Lb--27599). ALABAMA: Dallas Co.: Perdue 4152 (W--2422193). ARKANSAS: Ouachita Co.: Demaree 48182 (Lw). Saint Francis Co.: Demaree 15103 (Lb--47033). LOUISIANA: Vernon Par.: R. L. McGregor 15570 (Lw). TEXAS: Harris Co.: Beamer s.n. [April 30, 1953] (Lw). Nueces Co.: F. B. Jones 6192 (Ww). San Patricio Co.: F. B. Jones 1924 (Ww). BRAZIL: Rio de Janeiro: Glaziou 6048 (Ja--11150).

VERBENA CALLIANTHA Briq.

Additional bibliography: Moldenke, Phytologia 10: 97 (1964), 11: 189 (1964), and 11: 290 & 315. 1965.

VERBENA CAMERONENSIS L. I. Davis

Additional bibliography: Moldenke, Résumé Suppl. 10: 2. 1964; Moldenke, Phytologia 10: 97 (1964) and 11: 307. 1965.

The flowers are described as "rose-blue" on McGregor 16442. The species has been found on the floodplains of small rivers, fruiting in February.

Additional citations: MEXICO: Puebla: R. L. McGregor 16442 (Lw).

VERBENA CAMPESTRIS Moldenke

Additional bibliography: Reitz, Sellowia 11: 57 & 134. 1959; Moldenke, Phytologia 10: 97. 1964.

VERBENA CANADENSIS (L.) Britton

Additional & emended synonymy: Anonymos caroliniensis Walt., Fl. Carol. 164. 1788 [not Anonymos caroliniensis Walt., op. cit. 263, nor A. caroliniens Walt., op. cit. 188. 1788]. Verbena aubrietiae Schnarf, Ost. Bot. Zeitschr. 74: 41, sphalm. 1925; Schnarf in Linsb., Handb. Pflanzenanat. 10 (2): 233 & 688, sphalm. 1929. Lobelia aubrietiae Jönsson ex Schwencke, Zytol. Untersuch. Verbenac. 6, in syn. 1931. Canadea aubletia Patermann, Beitr. Zytol. Verbenac. 13, 43, & [54], pl. 1, fig. 1 & 2. 1935. Verbena canadensis f. canadensis [Steyerm.], Fl. Mo. 1260 & 1261. 1963.

Additional bibliography: Jönsson, Bot. Notiser 6: 169--187. 1881; Schnarf, Ost. Bot. Zeitschr. 74: 41. 1925; Linsb., Handb. Pflanzenanat. 10 (2): 233 & 688. 1929; Schwencke, Zytol. Untersuch. Verbenac. 6, 12, & 24--25. 1931; Patermann, Beitr. Zytol. Verbenac. 13--15, 43, 49, & [54], pl. 1, fig. 1 & 2. 1935; D. B. Ward, Rhodora 64: 91. 1962; Steyerm., Fl. Mo. 1257 & 1260--1263, map 1845, pl. 303, fig. 1. 1963; Sharma & Mukhopadhyay, Journ. Genet. 58: 359, 372, 384, & pl. 12, fig. 54. 1963; Taylor & Hamblin, Handb. Wild Fl. Cult. 168--169 & 267. 1963; Moldenke, Résumé

Suppl. 10: 1 & 7 (1964) and 11: 1--3 & 5--8. 1964; Moldenke, Phytologia 10: 97--98, 113, 114, 122, 124, 125, 154, 282, 283, 311, & 499 (1964), 11: 28--30, 32, 33, 41, 43, 47, 85, & 86 (1964), and 11: 200, 263, 264, 268, 271, 279, 290, 302, 315, & 326. 1965.

Additional illustrations: Patermann, Beitr. Zytol. Verbenac. pl. 1, fig. 1 & 2. 1935; Steyerm., Fl. Mo. pl. 303, fig. 1. 1963; Sharma & Mukhopadhyay, Journ. Genet. 58: 384, pl. 12, fig. 54. 1963.

Ward (1962) agrees that the Anonymos caroliniensis of Walter, Fl. Carol., page 164 (1788) is probably Verbena canadensis, but he is of the opinion that the similar binomial on page 263 possibly refers to Hydnum erinaceus Bull., while the A. caroliniens on page 188 is Amphicarpa bracteata (L.) Fern.

The corolla of Verbena canadensis is described as "reddish-violet" on Harms 1379. The haploid chromosome number is given as 6 by Schwencke (1931) and by Patermann (1935).

Recent collectors have found the species in sandy grasslands, fencerows and roadside fencerows, bluestem prairie hay meadows, roadside ditches, thickets in limestone glades, prairie hayfields and dry roadside prairie hayfields, basic soil of cedar glades, loose soil of old limestone quarries, clay or dry rocky soil, or dry clay soil in cutover woodlands, on roadside and rocky prairie banks, roadside banks bordering wasteland fields, open sandy or eroded banks, open rocky banks of bluestem prairie, somewhat overgrazed and weedy rocky prairie hillsides, rocky wooded or shady oak-wooded hillsides, and prairies around the edge of lakes, and at the edges of roadside ditches, bluestem prairies, prairie pastures, and woods. In Kansas it is described by Volle as "common in grasslands in dry sandy clay soil", by Horr as "common on roadsides and wasteland in dry loam and clay", by Wagenknecht as occurring in "dry sandy soil along edges of disturbed areas on hilltops", and by Hulbert as "scarce in rocky area on southwest-facing slope in annually mowed native prairie". Marsh found it "scattered on sandy slope near springs" and "along roadside cut in hillside of rolling prairie area, glacially deposited soil with sand, clay, limestone rocks, and small granitoid boulders"; Lathrop found it in "open oak woods, sandy soil in clearing, sandstone surfacing", "roadside bank of bottomland farming area, limestone surfacing", "overgrazed prairie pasture with Maclura pomifera along crest of gully", and "common on oak-wooded hillside, sandstone outcrops".

McGregor calls the species "common on banks in rocky limestone prairie", "common in open places on rocky wooded hillsides", "common on dry rocky prairie banks", "forming large colony on roadside bank at edge of cultivated fields", "isolated colonies scattered on rocky prairie hillslope, most common on eroded areas", "large colonies on prairie banks", "on rocky banks, limestone surfacing, in native bluestem prairie meadow", "common on slopes, rocky overgrazed pastures", "common near limestone escarpment on rocky prairie hillsides", "common in area of limestone outcrops",

"common on prairie banks", "scattered on bank of little ravine in prairie", "scattered colonies in rocky wooded hillsides", and "common on rocky prairie hillsides, limestone surfacing".

Taylor & Hamblin (1963) call the species "rose verbena" and say that it is a plant "for sandy soil in full sun" and "The plant is easily grown in wild gardens, but in good soil it usually dies in a few years. It may be carried on indefinitely, however, by starting new plants from the self-rooting stems. This species grows in sandy, rocky, neutral to moderately acid soils from Florida to Texas, north to Virginia, Illinois, and Colorado."

Material of this plant has also been misidentified and distributed in herbaria as xVerbena blanchardi Moldenke. On the other hand, the R. L. McGregor 7212 & 7214, distributed as V. canadensis, are var. candidissima (Haage & Schmidt) Palmer & Steyerm.; B. F. Bush 15503 is V. ambrosifolia Rydb.; W. H. Horr 4983, Hulbert 3582, Ireland 71, R. L. McGregor 9295 & 9575, and B. L. Wagenknecht 2438 are V. bipinnatifida Nutt.; Rickett s.n. [Friendship, June 24, 1926] is V. bracteata Lag. & Rodr.; R. Runyon 2497 is V. ciliata var. longidentata Perry; W. H. Horr 3086 is xV. deamii Moldenke; R. Runyon 2625 is V. delticola Small; B. L. Wagenknecht 3615 is V. tenuisecta Briq.; and B. L. Wagenknecht 3620 is V. tenuisecta var. alba Moldenke. As noted above, the R. Runyon 2497 & 2625, cited in Phytologia 8: 453 (1962) and 465 (1963) as V. canadensis, are actually V. ciliata var. longidentata and V. delticola, respectively.

Steyermark (1963) records V. canadensis also from Benton, Bollinger, Butler, Caldwell, Camden, Cass, Cedar, Christian, Cole, Dade, Dallas, Dent, Douglas, Gasconade, Grundy, Hickory, Howard, Howell, Laclede, McDonald, Moniteau, Montgomery, New Madrid, Oregon, Osage, Perry, Pettis, Platte, Polk, Pulaski, Ralls, Ray, Reynolds, Ripley, Texas, Warren, Wayne, Webster, & Wright Counties, Missouri, based on specimens in the herbarium of the Missouri Botanical Garden at Saint Louis, not as yet seen by me.

Additional citations: IOWA: Mahaska Co.: H. N. Moldenke 21941 (Lw). TENNESSEE: Rutherford Co.: Demaree 47565 (Lw). KANSAS: Allen Co.: R. L. McGregor 10012 (Lw), 12748 (Lw). Anderson Co.: R. L. McGregor 4271 (Lw); E. L. Richards 328 (Lw); B. L. Wagenknecht 3651 (Lw). Bourbon Co.: E. W. Lathrop 3789 (Lw); R. L. McGregor 9924 (Lw). Brown Co.: R. L. McGregor 17020 (Lw). Chautauqua Co.: W. H. Horr s.n. [July 5, 1930] (Lw); E. W. Lathrop 2141 (Lw); R. L. McGregor 4210 (Lw). Cherokee Co.: E. W. Lathrop 2692 (Lw); R. L. McGregor 15264 (Lw), 15332 (Lw). Clay Co.: R. L. McGregor 5530 (Lw). Coffey Co.: W. H. Horr 3496 (Lw). Cowley Co.: D. L. Marsh 426 (Lw). Crawford Co.: R. L. McGregor 11176 (Lw). Douglas Co.: C. A. Benson s.n. [Baldwin, May 29, 1932] (Lb-27607); D. L. Marsh 1522 (Lw); R. L. McGregor 4228 (Lw), 11289 (Lw); Ungar 1a (Lw). Elk Co.: Fearing & Latham s.n. [August 10,

1950] (Lw); R. L. McGregor 4460 (Lw), 9059 (Lw), 11197 (Lw). Franklin Co.: Hetzer 91 (Lw); Hulbert 3397 (Lw); R. L. McGregor 10048 (Lw). Greenwood Co.: R. L. McGregor 10322 (Lw, Lw), 11208 (Lw). Jefferson Co.: G. Latham 79 (Lw). Johnson Co.: B. L. Wagenknecht 2584 (Lw), 2605 (Lw), 3699 (Lw). Labette Co.: R. L. McGregor 17442 (Lw). Linn Co.: H. N. Moldenke 21925 (Lw). Miami Co.: R. L. McGregor 4242 (Lw). Montgomery Co.: W.H. Horr s.n. [July 5, 1930] (Lw); R. L. McGregor 4331 (Lw), 10189 (Lw). Neosho Co.: W. W. Holland 153 (Lw); E. L. Richards 3160 (Lw). Pottawatomie Co.: R. L. McGregor 5473 (Lw). Shawnee Co.: V. L. Harms 1379 (Lw); Volle 653 (Lw). Wabaunsee Co.: V. L. Harms 1431 (Lw); Maus 36 (Lb--15169); R. L. McGregor 5548 (Lw). Wilson Co.: R. L. McGregor 4300 (Lw); Vaugn s.n. [May 1, 1937] (Lw). Woodson Co.: R. L. McGregor 4174 (Lw); E. W. Latnrop 34 (Lw), 169 (Lw), 369, in part (Lw). MISSOURI: Barton Co.: Z. Williams s.n. [Lamar, August 1928] (Lb--4158). Boone Co.: Bell s.n. [Columbia, 4/16/1801] (Lb--4144); H. E. Bradley s.n. [Columbia, Apr. 29, '02] (Lb--4142); Daniels s.n. [Columbia, Apr. 1897] (Lb--4143), s.n. [Columbia, May 11, 1902] (Lb--4147, Lb--4148, Lb--4154), s.n. [Columbia, May 1903] (Lb--4151, Lb--4152, Lb--4155), s.n. [Columbia, June 1903] (Lb--4146); Drouet 2763 (Lb--25810); D. B. Dunn 12437 (Lb--37875); Favor s.n. [Aug. 29, 1901] (Lb--4139, Lb--4149), s.n. [Columbia, May 2, 1903] (Lb--4153); S. Gray s.n. [Columbia, May 17, 1898] (Lb--4157); G. E. Moore 4 (Lb--11438); Oungst s.n. [April 15th, 1933] (Lb--11464); Rickett s.n. [April 1926] (Lb--7099, Lb--7100), s.n. [Rocheport, July 4, 1927] (Lb--7101), s.n. [Bear Spring, April 20, 1929] (Lb--7102), s.n. [Grindstone Park, June 1, 1929] (Lb--7103); J. R. Singleton s.n. [April 18, 1936] (Lb--34618); O. L. Steele s.n. [Columbia, Apr. 17, 1902] (Lb--4145, Lb--4150); J. Sylvester 3 (Lb--15148); Van Horn s.n. [Columbia, 7/27/25] (Lb--10953). Cooper Co.: B. F. Bush 14425 (Lb--15596). Crawford Co.: H. N. Moldenke 21916 (Lw). Franklin Co.: J. M. Mason s.n. [Meramec State Park, 4/19/37] (Lb--34369). Greene Co.: M. Carter s.n. [Galloway, April 10, 1929] (Lb--14484). Harrison Co.: R. J. Lemaire 1188 (Lb--49412). Iron Co.: Broadhead s.n. (Lb--4159). Jackson Co.: B. F. Bush s.n. [5-19-1891] (Lb--4156). Jasper Co.: Miles s.n. [5/1/1898] (Lb--47639). Lawrence Co.: E. J. Palmer 53390 (Lb--50946). Madison Co.: Swallow s.n. [July 1858] (Lb--2072). Maries Co.: A. R. Moldenke 852 (Lw). Marion Co.: Broadhead s.n. [May 1856] (Lb--9609). Miller Co.: Damon s.n. [April 12, 1938] (Lb--34761). Morgan Co.: B. F. Bush 14445 (Lb--15681). Newton Co.: E. J. Palmer 53471 (Lb--50947). Phelps Co.: A. Mtl-ler s.n. [Meramec, March 30, 1935] (Lb--24970). Scott Co.: R. R.

Kincaid s.n. [Commerce, Aug. 24, 1927] (Lb--4140, Lb--4141). Taney Co.: D. Spencer 123 (Lb--35300), s.n. [9.16.40] (Lb--48917), s.n. [4.12.41] (Lb--35530, Lb--48916). County undetermined: R. Baker s.n. [Lovers Leap, May 18, 1924] (Lb--9000); Dalke s.n. [Indian Trail State Forest, 9.10.39] (Lb--48915); Ryckman s.n. [Tirisport, May 1st] (Lb--33264). ARKANSAS: Franklin Co.: Demaree 20890 (Lb--53396). Izard Co.: A. Robinson 1790 (Lw). Lawrence Co.: Demaree 25957 (Lb--47027). Marion Co.: Demaree 47941 (Lw); D. B. Dunn 12837 (Lb--39826). Saline Co.: Demaree 34771 (Lb--53413). Stone Co.: D. L. Marsh 637 (Lw). LOUISIANA: Cameron Par.: S. M. Tracy 8707 (Lb--27606). OKLAHOMA: Latimer Co.: V. L. Harms 173 (Lw). Pittsburg Co.: McClary s.n. [Marsh 30, 1935] (Lb--32371). TEXAS: Galveston Co.: Joor s.n. [Galveston] (Lb--27609). Harris Co.: Joor s.n. [March 3, '77] (Lb--27598), s.n. [March 9, '77] (Lb--27608). Marion Co.: B. L. Wagenknecht 3529 (Lw). CULTIVATED: Missouri: Kucera s.n. [Mar. 1957] (Lb--37518). Wisconsin: H. N. Moldenke 21942 (Lw).

VERBENA CANADENSIS f. CANDIDISSIMA (Haage & Schmidt) Palmer & Steyerm.

Additional bibliography: Steyerm., Fl. Mo. 1260 & 1261, map 1845. 1963; Moldenke, Résumé Suppl. 10: 1. 1964; Moldenke, Phytologia 10: 98. 1964.

This form has been found by McGregor on rocky prairie banks at the edge of woods and rocky prairie roadside banks, flowering and fruiting in May. He describes the flowers on his no. 7214 as "white, fading to pink in drying".

Additional citations: KANSAS: Bourbon Co.: R. L. McGregor 7212 (Lw). Crawford Co.: R. L. McGregor 7214 (Lw).

VERBENA CANESCENS H.B.K.

Additional bibliography: Irwin, Roadside Flow. Tex. 190. 1961; Moldenke, Résumé Suppl. 11: 3. 1964; Moldenke, Phytologia 10: 98--100, 140, 141, 176--179, 182, 184--186, 303, 304, 306, & 502 (1964), 11: 12--14, 18, 32, & 43 (1964), and 11: 256. 1965.

In Texas this species has been found by Jones in brushy pastures, in sandy loam soil over caliche and in caliche outcrops, locally abundant, and in sandy loam on caliche hillsides, flowering and fruiting in March and April. In Mexico it has been found by McGregor and other recent collectors "prostrate on rocky open wooded hillside", "scattered on dry rocky shrubby range", "in open pine forest, gypsum soil", and "scattered along ditches", at altitudes of 5370 to 7000 feet, flowering and fruiting in July. The flowers are described as "blue" on McGregor 16512, 16644, & 16725 and McGregor, Harms, Robinson, R. del Rosario, & Segal 98. Jones 1822 is said to have had "light violet-blue" flowers.

The species is recorded from Amazonas, Colombia (San Cristobal), by Troncoso, but is seems most unlikely that this is correct.

Additional citations: TEXAS: Jim Wells Co.: F. B. Jones 1822 (Ww), 2935 (Ww). MEXICO: Nuevo Leon: R. L. McGregor 16725 (Lw); McGregor, Harms, Robinson, R. del Rosario, & Segal 98 (Lw). Oaxaca: R. L. McGregor 16512 (Lw). San Luis Potosí: R. L. McGregor 16644 (Lw)

VERBENA CANESCENS f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 99 & 100. 1964.

VERBENA CANESCENS var. ROEMERIANA (Scheele) Perry

Additional bibliography: G. Rzedowski, Act. Cientif. Potos. 4: 65 & 91. 1960; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 143. 1961; Moldenke, Résumé Suppl. 10: 2. 1964; Moldenke, Phytologia 10: 99--100 & 182 (1964) and 11: 13--15 & 18. 1964.

Lathrop found this variety growing in sandy soil of rocky gullies, with granite outcrops on the slopes with juniper, Yucca, and Opuntia, while Jones found it in sandy loam on road shoulders, flowering and fruiting in April. Lathrop 2075 is a mixture with V. plicata Greene. The F. B. Jones 1822 & 2935, distributed as V. canescens var. roemeriana, seem to be typical V. canescens H.B.K.

Additional citations: TEXAS: Bee Co.: F. B. Jones 1732a (Ww). Burnet Co.: E. W. Lathrop 2075, in part (Lw).

VERBENA CANIUENSIS Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 27: 984. 1953; Moldenke, Phytologia 8: 482--483. 1963.

VERBENA CAROLINA L.

Additional bibliography: Schlecht., Ann. Sci. Nat., ser. 3, 14: 342--344. 1850; Moldenke, Phytologia 10: 100--101, 104, 129, 130, 140, 141, 280, & 314 (1964) and 11: 13, 54--56, 86, 105, 123, 126-128, & 164. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1239. 1964; Hocking, Excerpt. Bot. A.7: 455. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 748 & 1010. 1964; Moldenke, Phytologia 11: 336, 338, 341, & 344. 1965.

Fearing & Thompson describe the corolla of this plant as "very light-blue". They found the plant in dense pine forests in black volcanic soil. Breedlove encountered it on rocky slopes. In Shreve & Wiggins (1964) its distribution is said to be "In diverse soils and habitats, Lower Sonoran to Hudsonian Zones, from Pima County, Arizona, through most of Mexico including southern Baja California to El Salvador; ascending to 10,500 feet."

Additional citations: MEXICO: Chiapas: Breedlove 5984 (Z). Morelos: Fearing & Thompson 131 (Lw).

VERBENA CATHARINAE Moldenke

Additional bibliography: Reitz, Sellowia 11: 57 & 134 (1959) and 12: 157. 1960; Moldenke, Phytologia 10: 101. 1964.

Common names recorded for the species are "camaradinha", "formosa sem dote", and "jurupeba", but these are applied also to most members of this genus in southern Brazil.

VERBENA CHEITMANIANA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 101 (1964) and 11: 123. 1964.

VERBENA CHILENSIS Moldenke

Additional bibliography: R. A. Phil., Anal. Univ. Chil. 35: 190--191. 1870; Muñoz Pizarro, Espec. Plant. Descr. Philippi 111. 1960; Moldenke, Phytologia 10: 101. 1964.

The isotype photographed by Macbride as his type photograph number 17417 was deposited in the herbarium of the Botanisches Museum at Berlin, now unfortunately destroyed.

Additional citations: CHILE: Mendoza: R. A. Philippi s.n. [Mendoza; Herb. Mus. Nac. Hist. Nat. Chile 42446 & 54790; Macbride photos 17417] (N--photo of isotype).

VERBENA CILIATA Benth.

Additional synonymy: Verbena ciliata var. ciliata [Moldenke] in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1244. 1964.

Additional bibliography: G. Rzedowski, Act. Cientif. Potos. 4: 65 & 91. 1960; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 143--144. 1961; Moldenke, Résumé Suppl. 11: 3 & 4. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1244. 1964; Moldenke, Phytologia 10: 101--102, 148, & 283 (1964) and 11: 32, 43, 48, 49, 105, 156, 158, 188, & 189 (1964), and 11: 308, 310, & 326. 1965.

McGregor describes the corollas of this plant as "reddish", while F. B. Jones says for his no. 1867: "corollas white in contrast to the usual violet-blue [of var. longidentata] which was present at same locality; several specimens of white form noted; prob. albino of V. bipinnatifida." He found the plant in clay soil along roadsides; McGregor found it prostrate in dry level rocky grassland; and Maguire reports it "on rocky granitic slopes with oaks" at 6,000 feet altitude. These collectors found it flowering and fruiting in April and May. It has been misidentified and distributed in herbaria as V. bipinnatifida Nutt. and as V. wrightii A. Gray.

Shreve & Wiggins (1964) describe its natural distribution as "On flats, sandy plains, dry limestone hills, and rocky slopes, mainly above the Sonoran Desert (ascending to nearly 12,000 feet) from Arizona to Oklahoma and Texas and south to Oaxaca, with isolated records from Tennessee and South Dakota. Entering the margin of the Sonoran Desert near Tucson and Aguila, Arizona."

The F. B. Jones 4478 and C. M. Rowell 4702, distributed as V. ciliata, are actually var. longidentata Perry.

Additional citations: TEXAS: San Patricio Co.: F. B. Jones 1867 (Ww). NEW MEXICO: Otero Co.: D. B. Dunn 3276 (Lb--48447).

Socorro Co.: D. B. Dunn 3039 (Lb--48469); Dunn & Levine 3439 (Lb-48192); Dunn & Lint 4384 (Lb--53810). Torrance Co.: D. B. Dunn 6445 (Lb--40930). ARIZONA: Graham Co.: B. Maguire 10542 (N). MEXICO: Jalisco: R. L. McGregor 16626 (Lw).

VERBENA CILIATA var. LONGIDENTATA Perry

Additional bibliography: Moldenke, Phytologia 10: 102 & 283 (1964) and 11: 32 & 43. 1964.

Recent collectors have found this plant in clay of open pastures and in sandy pastures, while Rowell notes it as "occasional to locally frequent in sandy loam and tight soils". His no. 4702 is said to have had "pale-purple" corollas. The plant has been found in flower in February and March and in fruit in March. Herbarium material has been misidentified and distributed as V. bipinnatifida Nutt., V. canadensis (L.) Britton, and V. ciliata Benth. Runyon 2497 was previously cited by me as V. canadensis, but this is erroneous.

Additional citations: TEXAS: Bee Co.: F. B. Jones 2842 (Fj). Cameron Co.: R. Runyon 2497 (N, N, N). San Patricio Co.: F. B. Jones 4445 (Fj), 4478 (Ww); C. M. Rowell 4702 (Ww).

VERBENA CILIATA var. PUBERA (Greene) Perry

Additional bibliography: Moldenke, Phytologia 10: 102 (1964) and 11: 48. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1245. 1964.

Maguire, Richards, & Moeller assert that this plant is "common in grass of Hilaria mutica type, with Prosopis, Yucca elata, on sandy flats", flowering and fruiting in May. In Shreve & Wiggins (1964) its distribution is given as "In cindery soil, on sandy clay flats, sandy and grassy plains, and washes, mainly Upper Sonoran Zone, southern California to western Texas. Possibly entering the Sonoran Desert along the eastern margin in Arizona."

Additional citations: NEW MEXICO: Grant Co.: Maguire, Richards, & Moeller 11503 (N).

VERBENA CLAVATA Ruíz & Pav.

Additional bibliography: Soukup, Biota 5: 42 & 134. 1964; Moldenke, Phytologia 10: 102. 1964.

Soukup (1964) records the vernacular name "tacpa".

VERBENA CLAVATA f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 9: 32. 1963; Soukup, Biota 5: 42. 1964.

VERBENA CLAVATA var. CASMENSIS Moldenke

Additional bibliography: Soukup, Biota 5: 42. 1964; Moldenke, Phytologia 10: 102. 1964.

xVERBENA CLEMENSORUM Moldenke

Additional bibliography: Moldenke, Phytologia 9: 33—34 (1963)

and 10: 102 & 210. 1964.

VERBENA CLOVERAE Moldenke

Additional bibliography: Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 144. 1961; Moldenke, Résumé Suppl. 11: 3. 1964; Moldenke, Phytologia 10: 102 & 178 (1964) and 11: 13. 1964; A. L. Moldenke, Phytologia 10: 238. 1964.

Recent collectors have found this species on sandy slopes near creeks, on sandy road shoulders, in open pastures, and scattered around depressions in dry rocky mesquite range. Williges calls it "rare" in San Patricio County, Texas, while F. B. Jones encountered it "usually on slopes" in Kleberg County. The flowers on R. L. McGregor 16764 are described as "blue".

Additional citations: TEXAS: Bee Co.: F. B. Jones 4547 (Ww). Kleberg Co.: F. B. Jones 2977 (Ww), 3801 (Ww). San Patricio Co.: F. B. Jones 6177 (Ww); Williges 5c (Ww). Webb Co.: R. L. McGregor 16764 (Lw).

xVERBENA CONATA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 103 & 210. 1964.

xVERBENA CORRUPTA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 103 & 498. 1964.

VERBENA CORYMBOSA Ruíz & Pav.

Additional bibliography: Muñoz Pizarro, Sin. Fl. Chil. 199. 1959; Moldenke, Phytologia 10: 103. 1964; Soukup, Biota 5: 42. 1964; A. & I. Nehrling, Pict. Book Perenn. 131. 1964.

xVERBENA COVASII Moldenke

Additional bibliography: Moldenke, Phytologia 10: 103 (1964), 11: 135 (1964), and 11: 290. 1965.

VERBENA CRITHMIFOLIA Gill. & Hook.

Additional bibliography: Hieron., Bol. Acad. Nac. Córdoba 4: 409. 1881; Hieron., Pl. Diaph. Fl. Argent. 215. 1882; Moldenke, Phytologia 10: 103, 110, 120, & 288. 1964.

VERBENA CUNEIFOLIA Ruíz & Pav.

Additional bibliography: Soukup, Biota 5: 42 & 134. 1964; Moldenke, Phytologia 10: 103, 287, & 296 (1964) and 11: 158 & 162. 1964.

Soukup (1964) records the common name "china verbena".

xVERBENA DEAMII Moldenke

Additional bibliography: Steyerm., Fl. Mo. 1260 & 1261, map 1844. 1963; Moldenke, Phytologia 10: 104 & 311 (1964) and 11: 202 & 203. 1964; Moldenke, Résumé Suppl. 10: 1. 1964.

Material of this hybrid has been misidentified and distributed

in herbaria as V. canadensis (L.) Britton. On the other hand, the W. H. Horr 4679, distributed as xV. deamii, is actually V. hastata L.

Additional citations: KANSAS: Gray Co.: W. H. Horr 3086 (Lw).

VERBENA DELTICOLA Small

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1243. 1964; Moldenke, Phytologia 10: 104 (1964), 11: 32, 43, & 44 (1964), and 11: 326. 1965.

The R. Runyon 2625, cited below, was erroneously cited in Phytologia 8: 465 (1963) as V. canadensis (L.) Britton. In Shreve & Wiggins (1964) V. delticola is described as being found "In sandy, adobe, clay, loam, or alluvial soils, or even limestone or rocky areas in diverse situations, Sonoran Zone, central Sonora to Texas and south to Puebla and Vera Cruz, Mexico. Often in cutlivated ground in fields and orchards."

Additional citations: TEXAS: Hidalgo Co.: R. Runyon 2625 (N, N).

VERBENA DEMISSA Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 27: 2026. 1953; Moldenke, Phytologia 9: 202. 1963.

VERBENA DISSECTA Willd.

Additional & emended bibliography: Reitz, Sellowia 13: 67 & 110. 1961; Moldenke, Phytologia 10: 104, 148, 189, 295, 299, & 311 (1964) and 11: 20, 24, 25, 61, 122, & 189 (1964), and 11: 243, 246, 270, 273, 276, 280, 290, & 291. 1965.

The type specimen of this species, photographed by Macbride as his type photograph no. 17460, was originally deposited in the herbarium of the Botanisches Museum at Berlin, but is now destroyed. Cárdenas found this species growing on rocky slopes.

Additional citations: BOLIVIA: Cochabamba: M. Cárdenas 5578 (W--2429778). CHILE: Province undetermined: Née s.n. [Herb. Willdenow 11139; Macbride photos 17460] (N--photo of type).

xVERBENA DISSOLUTA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 104 & 498 (1964) and 11: 290. 1965.

VERBENA DOMINGENSIS Urb.

Additional bibliography: Moldenke, Phytologia 9: 203 (1963) and 10: 212, 217, 219, & 230. 1964.

Additional citations: HISPANIOLA: Dominican Republic: B. Augusto 1047 (N), 1087 (N), 1109 (N).

VERBENA EHRENBERGIANA Schau.

Additional bibliography: Schlecht., Linnaea 23: 714--722. 1850; Schlecht., Ann. Sci. Nat., ser. 3, 14: 342--344. 1850; Langman, Select. Guide Lit. Flow. Pl. Mex. 680 & 1010. 1964; Moldenke, Phytologia 10: 104 & 140 (1964) and 11: 338. 1965.

McGregor and his associates found this plant "scattered in open

places in dry rocky open wooded hillside" in Nuevo León and "scattered" on rocky very moist open hillsides in San Luis Potosí. Macbride's type photograph no. 17414 is of the type specimen in the herbarium of the Botanisches Museum at Berlin, now destroyed.

Additional citations: MEXICO: México: Ehrenberg 713 [Macbride photos 17414] (N--photo of type). Nuevo León: McGregor, Harms, Robinson, R. del Rosario, & Segal 156 (Lw). San Luis Potosí: Mc Gregor, Harms, Robinson, R. del Rosario, & Segal 906 (Lw).

VERBENA ELEGANS H.B.K.

Additional bibliography: Moldenke, Phytologia 10: 105 (1964), 11: 25 (1964), and 11: 308. 1965.

McGregor and his associates describe the flowers of this species as "purple" (176), "dark-purple" (51), or "reddish-blue" (254) on open mountainsides, and, in Nuevo León, "scattered in dry rocky open wooded hillside" or in "moist open forested area, well scattered".

Additional citations: MEXICO: Nuevo León: McGregor, Harms, Robinson, R. del Rosario, & Segal 51 (Lw), 176 (Lw), 254 (Lw). San Luis Potosí: R. L. McGregor 16662 (Lw).

VERBENA ELEGANS var. ASPERATA Perry

Additional bibliography: Moldenke, Phytologia 10: 105 (1964) and 11: 25. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1244. 1964.

The Gizantoro s.n. [9.66] collection cited in Phytologia 9: 203 (1963) as from an undetermined locality, appears, after a deciphering of the longhand inscription by my colleagues at Lund, to have been collected in Germany from plants which had escaped from cultivation there.

In Shreve & Wiggins (1964) the distribution of this variety is given as "On limestone or even bare sandstone outcroppings in mountains and canyons, in various soils and situations but characteristic of arroyo margins, ascending to 8,000 feet, chiefly Upper Sonoran and Transition Zones, Sonora to Texas, Hidalgo, and Zacatecas but entering the Sonoran Desert near Hermosillo and Magdalena, Sonora."

xVERBENA ENGELMANNII Moldenke

Additional & emended synonymy: Verbena engelmanni Moldenke, Résumé Suppl. 2: 11, in syn. 1960; Steyerm., Fl. Mo. 1258, map 1840. 1963. Verbena hybrida Pech. ex Moldenke, Résumé Suppl. 11: 8. in syn. 1964 [not xV. hybrida Voss, 1873]. Verbena xengelmanii Moldenke ex Henry & Buker, Trillia 12: 125, sphalm. 1964.

Additional bibliography: Steyerm., Fl. Mo. 1258, map 1840. 1963; Moldenke, Résumé Suppl. 10: 1 (1964) and 11: 1, 2, & 8. 1964; Henry & Buker, Trillia 12: 125. 1964; Moldenke, Phytologia 10: 105—106, 109, 130, 154, & 160 (1964), 11: 102, 127, & 201 (1964), and 11: 336—338 & 340—342. 1965.

Recent collectors have found this natural hybrid in flower and fruit in July and August. McGregor found it "scattered among parents in low place in prairie" in Greenwood County, Kansas, and "with parents in ravine in prairie" in Barber County. Poindexter encountered it in a "brushy overgrazed pasture" in Douglas County and reports its pollen fertility as 41 percent and the chromosome number as n = 7. Morley found it "scattered in creek bottom in good loam soil" in Republic County and describes the corolla as "light lavender with lighter center" or "light-lavender with lighter throat when fresh". My son and I observed it in thirteen localities in six states this past summer and in all cases found it to be very distinct from both parents not only in the color of the corollas, but also in its greater height than either parent and its wide-spreading inflorescences.

Additional citations: NEW JERSEY: Passaic Co.: A. R. Moldenke 785 (Lw). ILLINOIS: Edgar Co.: A. R. Moldenke 811 (Lw). Macon Co.: A. R. Moldenke 821 (Lw, Ut, Z, Z). Pike Co.: A. R. Moldenke 836 (Lw). Scott Co.: A. R. Moldenke 832 (Lw). IOWA: Clayton Co.: A. R. Moldenke 989 (Lw). Iowa Co.: A. R. Moldenke 974 (Lw, Ut). Marion Co.: A. R. Moldenke 953 (Lw). Poweshiek Co.: A. R. Moldenke 965 (Lw). Warren Co.: A. R. Moldenke 947 (Lw, Ut). MICHIGAN: Montcalm Co.: A. R. Moldenke 1036 (Lw). WISCONSIN: Grant Co.: A. R. Moldenke 999 (Lw, Ut). KANSAS: Barber Co.: R. L. McGregor 14611 (Lw). Brown Co.: A. R. Moldenke 912 (Lw). Douglas Co.: J. D. Poindexter 191-23 (Lw). Greenwood Co.: R. L. McGregor 14700 (Lw). Republic Co.: G. E. Morley 804 (Lw), 813 (Lw). MISSOURI: Pike Co.: Fritchey 563 (Lb--4175). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated s.n. (Lb--27615).

VERBENA EPHEDROIDES Cham.

Additional bibliography: Hieron., Bol. Acad. Nac. Córdoba 4: 408. 1881; Hieron., Pl. Diaph. Fl. Argent. 214. 1882; Moldenke, Phytologia 10: 106, 122, & 304 (1964) and 11: 121. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

xVERBENA FABRICATA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 106 (1964) and 11: 337. 1965.

VERBENA FASCICULATA Benth.

Additional bibliography: Soukup, Biota 5: 42. 1964; Moldenke, Phytologia 10: 106. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

xVERBENA FERAX Moldenke

Additional bibliography: Moldenke, Phytologia 10: 106 (1964) and 11: 47. 1964.

VERBENA FERREYRAE Moldenke

Additional bibliography: Moldenke, Phytologia 9: 118. 1963;

Soukup, Biota 5: 42. 1964.

VERBENA FILICAULIS Schau.
Additional bibliography: Moldenke, Phytologia 10: 106 & 120. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

VERBENA FLAVA Gill. & Hook.
Additional bibliography: R. A. Phil., Anal. Univ. Chil. 35: 191. 1870; Moldenke, Phytologia 10: 106—107. 1964.

VERBENA GALAPAGOSENSIS Moldenke
Additional bibliography: Moldenke, Phytologia 9: 124 (1963), 11: 188 (1964), and 11: 317. 1965.

VERBENA GENTRYI Moldenke
Additional bibliography: Moldenke, Phytologia 10: 107. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 516 & 1010. 1964.

VERBENA GLABRATA H.B.K.
Additional bibliography: Soukup, Biota 5: 42. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 107 (1964) and 11: 317. 1965.

VERBENA GLANDULIFERA Moldenke
Additional bibliography: Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 107 & 148 (1964) and 11: 273. 1965.
The Jürgensen 1026 collection cited in Phytologia 9: 129 (1963) is a mixture with V. tenera Spreng.

VERBENA GLUTINOSA Kuntze
Additional bibliography: Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 107. 1964.
The isotype of this species photographed by Macbride as his type photograph no. 17418 was deposited in the herbarium of the Botanisches Museum at Berlin, but is now destroyed.
Additional citations: ARGENTINA: Mendoza: Kuntze 2 [Macbride photos 17418] (N--photo of isotype).

xVERBENA GONZALEZI Moldenke
Additional bibliography: Moldenke, Phytologia 10: 107 & 301. 1964.

VERBENA GOODDINGII Briq.
Emended synonymy: Verbena gooddingii var. gooddingii Briq. ex Moldenke, Résumé Suppl. 3: 38, in syn. 1962; Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1243. 1964.
Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1243. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 107, 306, & 307 (1964), 11: 32, 157, 158, & 200 (1964), and 11: 326. 1965.
In Shreve & Wiggins (1964) the distribution of this species is

given as "In sandy, limestone, and granitic soil on dry rocky slopes or gravelly hillsides, dry sandy washes, canyon floors, ravines, roadbanks, gravel bars, and grasslands, Lower Sonoran to Arid Transition Zones, southern Utah and Nevada to southern California, Sonora, and northern Baja California."

VERBENA GOODDINGII var. NEPETIFOLIA Tidestr.

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1243--1244. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 107--108 (1964), 11: 32 & 157 (1964), and 11: 326. 1965.

In Shreve & Wiggins (1964) the distribution of this variety is given as "In granitic soil, dry and rocky slopes, red clay hillsides, the sides of ravines, on banks of small streams, and along arid roadsides, often associated with Prosopis and Simmondsia, Lower and Upper Sonoran Zones, from Arizona and southern California to central Baja California and Nuevo León."

xVERBENA GOODMANI Moldenke

Additional bibliography: Moldenke, Phytologia 10: 108 (1964) and 11: 203. 1964.

VERBENA GRACILESCENS (Cham.) Herter

Additional bibliography: Moldenke, Phytologia 10: 108, 210, 211, 216, 217, & 296 (1964) and 11: 158 & 162. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

VERBENA GRACILIS Desf.

Additional bibliography: Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 108, 112, 179, 182, & 186 (1964), 11: 13 & 14 (1964), and 11: 256 & 308. 1965.

VERBENA GYNOBASIS Wedd.

Additional bibliography: Muñoz Pizarro, Espec. Plant. Descr. Philippi 110. 1960; Moldenke, Phytologia 9: 158--160. 1963; Soukup, Biota 5: 42. 1964.

The Philippi specimen photographed by Macbride as his type photograph no. 17419 was deposited in the herbarium of the Botanisches Museum at Berlin, but is now unfortunately destroyed.

Additional citations: CHILE: Tarapacá: R. A. Philippi s.n. [Sibaya; Macbride photos 17419] (N--photo).

VERBENA GYNOBASIS var. STRIGOSA Wedd.

Additional bibliography: Moldenke, Phytologia 10: 108. 1964; Soukup, Biota 5: 42. 1964.

VERBENA HALEI Small

Additional bibliography: Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 144. 1961; Irwin, Roadside Flow. Tex. 190. 1961; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1238--1239. 1964; Moldenke, Phytologia 10: 99, 108, 140, 141, 178, 179,

182, 186, 192, 193, 210, 211, 216--218, 304, & 502 (1964) and 11: 13, 14, 111, 116, 128, 136, 164, 200, & 203. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

The corollas are described on Duncan 2-214 as "lavender-purple"; on Rowell 4779 as "pale-purple", and on McGregor 16762 as "blue".

Recent collectors have found this species in and around abandoned trick gardens, on low ridges, along ditches, in dry rocky mesquite range, in sandy soil of rocky xeric hillsides with Yucca, juniper, and cactus, on sandy banks, and in clayey pasture openings. Beamer reports it as "very common along roadsides and in pastures" in Montgomery County, Texas; Wagenknecht refers to it as a "common weed along edge of roadsides, grassy areas and fencerows" in Alachua County, Florida; while in San Patricio County, Texas, it is said by Rowell to be an "occasional herb in clay soils", "occasional in tight clay loam", and "frequent in black loam".

The F. B. Jones 1925 distributed as V. halei is actually V. runyoni Moldenke. In Shreve & Wiggins (1964) the distribution of V. halei is given as "In sandy or calcareous meadows, prairies, fields, and woodlands, on rocky hillsides and along roadsides, Sonoran Zones, from Alabama to Oklahoma and from south-central Arizona to Querétaro."

Goodman reports that the pale purplish-blue flowers on his no. 7470 are much larger than the flowers of the V. halei of southern Oklahoma. Perhaps field study is indicated here to determine if an undescribed variety is involved. In a letter to me dated December 26, 1964, he says "I suspect that you are quite right -- that V. halei is variable. I've known it best in its small flowered form in Marshall Co., Oklahoma."

Additional citations: GEORGIA: Sapelo Island: W. H. Duncan 20214 (Lb--42773). FLORIDA: Alachua Co.: B. L. Wagenknecht 2599 (Lw). MISSISSIPPI: Jackson Co.: J. Skehan s.n. [Ocean Springs, June 1892; Seymour & Earle 109] (Lb--16414). LOUISIANA: Cameron Par.: S. M. Tracy 8709 (Lb--27618). Rapides Par.: Demaree 47327 (Lw). TEXAS: Angelina Co.: R. L. McGregor 15558 (Lw). Burnet Co.: E. W. Lathrop 2046 (Lw). Montgomery Co.: Beamer s.n. [April 30, 1953] (Lw). San Patricio Co.: G. J. Goodman 7470 (Z); F. B. Jones 4558 (Ww); C. M. Rowell 4779 (Ww), 4869 (Ww), W.51 (Ww). Webb Co.: R. L. McGregor 16762 (Lw).

VERBENA HASSLERANA Briq.

Additional bibliography: Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 108 & 498 (1964) and 11: 315. 1965.

Pedersen found this species growing in wet ground and reports that its flowers were "purplish-pink".

Additional citations: PARAGUAY: Pedersen 5234 (W--2432879).

VERBENA HASTATA L.

Additional synonymy: Verbena hastata f. hastata Steyerm., Fl. Mo. 1258. 1963. Verbena lastata Taylor & Hamblin, Handb. Wild Fl.

Cult. 294, sphalm. 1963.

Additional bibliography: Schwencke, Zytol. Untersuch. Verbenac. 3, 12—14, 19, 26, 33, & 43, fig. 11. 1931; Patermann, Beitr. Zytol. Verbenac. 6, 10, 12—14, 19, 26, & 43. 1935; T. B. Mitchell, Bees East. U. S. 1 [N. C. Agr. Exp. Sta. Tech. Bull. 141]: 292. 1960; Anon., Algonquin Prov. Park Mus. Check-list 19. 1957; Anon., Billie Bear Plant List 8. 1961; Steyerm., Fl. Mo. 1257—1260, map 1841, pl. 302, fig. 5. 1963; Pinkava, Ohio Journ. Sci. 63: 125. 1963; Taylor & Hamblin, Handb. Wild. Fl. Cult. 168, 257, 279, & 294. 1963; Selle, Prog. & Abstr. Stud. Research Rep. 12th Annual Mann High School Biol. Cong. 10. 1964; Moldenke, Résumé Suppl. 10: 1 (1964) and 11: 1—3 & 8. 1964; A. & I. Nehrling, Pict. Book Perenn. 131. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964; Moldenke, Phytologia 10: 105, 106, 108—110, 129, 130, 152—155, 192, 210, 218, 219, & 307—311 (1964), 11: 101—103, 105, 113—118, 128, 163, 164, 167, 191, 195, 196, & 200—203 (1964), and 11: 233, 328, & 335—343. 1965.

Additional illustrations: Schwencke, Zytol. Untersuch. Verbenac. fig. 11. 1931; Steyerm., Fl. Mo. pl. 302, fig. 5. 1963; Taylor & Hamblin, Handb. Wild Fl. Cult. 168. 1963.

It is of interest to note that both Schwencke (1931) and Patermann (1935) report the haploid number of chromosomes for this species as 6. Poindexter gives n = 7 for his nos. 35, 195-13, and 229-13, with pollen fertility of 93 percent and 98 percent for the last two collections.

Recent collectors in Kansas have found this plant in boggy ground along the edges of springs, in sedge meadows, moist grassy areas, overgrazed pastures, moist sandy prairie ravines, sandy soil in low marshy areas along creeks, low places near small streams, along creek banks in mixed forest association, wet marshy places, sandy waste and stabilized sanddune pastures, in rocky prairie pastures in association with Lactuca scariola, Poinsettia dentata, and Tragopogon, and with Rudbeckia on creekbanks. McGregor reports it from "sandy bluestem pasture, moist ravine, scattered in the area" in Franklin County, "small colony on sandy riverbank" in Cheyenne County, "large colony in low place in prairie" in Greenwood County, "small colony in ravine in prairie" in Morris County, "overgrazed pasture in bluestem prairie, common in moist ravines" in Washington County, "common in low places in pastures" in Douglas County, and "abundant in low places in sand dunes" in Rice County, Kansas. Ungar found it "common on roadsides" and "scattered but common on road edges" in Stafford County. Horr found it in "alluvium with good soil mixture, local colonies" and "common in rich moist alluvium" of thickets on floodplains in Cheyenne County, "scattered" in wet sand of marshy areas and "common" in dry loam of grassland pastures in Washington County, "scattered in moist loam of floodland" in Meade County, "scattered in wet loam of roadside ditches" in Jefferson County, and "common" in artesian marsh in Meade County. In Republic County it was found by Morley "scattered near center of marshy area" and "common along head of lower seepage area". Its corollas are described as "purple" on W. H. Horr 4648 and as "blue"

on his no. 4697. This same collector regarded his nos. 4436, 4648, and 4697 as xV. blanchardi Moldenke and his no. 4679 as xV. deamii Moldenke.

My son and I noted this past summer that when this species grows in dry pasturelands, as it frequently does in the midwestern portions of its range, it develops a "field form" with the leaf-blades more canescent-puberulous beneath, slightly rough above, and the stem many-branched with many groups of terminal inflorescences more or less equally dense as the main one. Examples of this field form may be seen in A. R. Moldenke 905, 922, 927, 967, 971, 981, 983, 988, 1014, 1018, 1026, 1035, 1040, & 1046 and H. N. Moldenke 21937.

Mitchell (1960) reports that the bee, Calliopsis nebraskensis Crawford, feeds abundantly on the flowers of this species, the female taking pollen and nectar, but the male taking only nectar.

Taylor & Hamblin (1963) say that this is a plant for "moist woods" and that "When growing in large colonies, blue vervain casts a violet mist over the landscape. Single specimens are not so effective since only a few flowers are out at one time. This, the tallest of the verbenas, is of value in a planting of wild flowers in a moist area with such robust companions as boneset, Joe-Pye-weed, and ironweed.....This species is found in moist places in moderately acid soil from Nova Scotia to British Columbia, south to Florida, and west to Nebraska and Arizona."

Pinkava (1963) reports V. hastata from Sandusky County, Ohio. Steyermark (1963) records it from Adair, Andrew, Atchison, Audrain, Buchanan, Caldwell, Carroll, Cedar, Chariton, Clay, Dade, DeKalb, Franklin, Gentry, Harrison, Holt, Howell, Jefferson, Knox, Laclede, Lewis, Linn, Livingston, Macon, Mercer, Mississippi, Monroe, Montgomery, Newton, Oregon, Ozark, Perry, Pettis, Phelps, Pike, Putnam, Randolph, Ray, Saint Charles, Saint Clair, Saline, Schuyler, Shelby, Sullivan, Taney, Vernon, Warren, and Webster Counties, Missouri, on the basis of specimens preserved in the herbarium of the Missouri Botanical Garden at St. Louis, not yet seen by me. On p. 1261 of his work he says "A specimen from Grundy County (pastures, July 28, 1937, D. R. Crookshanks 142, in U. Mo. Herb.) appears to be a hybrid between V. bracteata and V. hastata." I have examined this specimen and regard it as xV. perriana Moldenke. The V. L. Harms 903 & 1107, R. L. McGregor 14858, J. D. Poindexter 201-3, and B. L. Wagenknecht 3149, distributed as V. hastata, all appear to be var. scabra Moldenke; D. B. Dunn 3179, 3217, 6138, 6215, & 6703 are V. macdougalii Heller; W. H. Horr 4691 and R. L. McGregor 14385 are xV. rydbergii Moldenke; and Drouet s.n. [July 12, 1931] and B. L. Wagenknecht 1890 are V. stricta Vent.

Additional citations: QUEBEC: Chambly Co.: A. Dubois 220 (N). ONTARIO: Elgin Co.: A. R. Moldenke 1045 (Lw). Essex Co.: A. R. Moldenke 1041 (Lw). Haldimand Co.: A. R. Moldenke 1048 (Lw). Kent Co.: A. R. Moldenke 1044 (Lw). Lambton Co.: Gaiser 3880G (Z), 4187G (Z),

4296Bos (Z). Norfolk Co.: A. R. Moldenke 1046 (Lw). Welland Co.: A. R. Moldenke 1049 (Lw). Walpole Island: Gaiser 4091W (Z), 4096W (Z), 4119W (Z), 4138W (Z). MASSACHUSETTS: Suffolk Co.: F. C. Seymour s.n. [Long Meadow, July 17, 1908] (Lb--27614). NEW YORK: Allegany Co.: A. R. Moldenke 1054 (Lw). Broome Co.: A. R. Moldenke 1062 (Lw). Cattaraugus Co.: A. R. Moldenke 1051 (Lw). Chautauqua Co.: Hayhurst s.n. [Fredonia, July 30, 1902] (Lb--27613). Chemung Co.: A. R. Moldenke 1057 (Lw). Chenango Co.: A. R. Moldenke 1063 (Lw). Delaware Co.: A. R. Moldenke 1064 (Lw); Wilkens s.n. [Stamford, August 5, 1919] (N). Erie Co.: A. R. Moldenke 1050 (Lw). Orange Co.: A. R. Moldenke 1066 (Lw). Rockland Co.: Lehr 412a (N), 412b (N). Schuyler Co.: A. R. Moldenke 1058 (Lw). Steuben Co.: A. R. Moldenke 1056 (Lw). Sullivan Co.: A. R. Moldenke 1065 (Lw). Tioga Co.: A. R. Moldenke 1061 (Lw). Tompkins Co.: A. R. Moldenke 1060 (Lw). PENNSYLVANIA: Armstrong Co.: H. N. Moldenke 21902 (Lw). Centre Co.: A. R. Moldenke 786 (Lw). Clarion Co.: H. N. Moldenke 21900 (Lw). Clearfield Co.: H. N. Moldenke 21895 (Lw). Columbia Co.: H. N. Moldenke 21891 (Lw). Jefferson Co.: H. N. Moldenke 21897 (Lw). Luzerne Co.: H. N. Moldenke 21890 (Lw). Northumberland Co.: H. N. Moldenke 21896 (Lw). OHIO: Darke Co.: H. N. Moldenke 21906 (Lw). Delaware Co.: A. R. Moldenke 796 (Lw). Harrison Co.: A. R. Moldenke 789 (Lw). Knox Co.: H. N. Moldenke 21903 (Lw). Miami Co.: A. R. Moldenke 798 (Lw). Morrow Co.: H. N. Moldenke 21904 (Lw). Tuscarawas Co.: A. R. Moldenke 790 (Lw). Union Co.: A. R. Moldenke 792 (Lw). ILLINOIS: Cass Co.: Geyer s.n. [Beardstown, July 1842] (Lb--27610). Douglas Co.: A. R. Moldenke 813 (Lw). Edgar Co.: A. R. Moldenke 810 (Lw). Macon Co.: A. R. Moldenke 818 (Lw). Morgan Co.: A. R. Moldenke 828 (Lw). Moultrue Co.: A. R. Moldenke 814 (Lw). Pike Co.: A. R. Moldenke 834 (Lw), 838 (Lw, Ut). Sangamon Co.: A. R. Moldenke 824 (Lw). Scott Co.: A. R. Moldenke 829 (Lw). INDIANA: Boone Co.: A. R. Moldenke 807 (Lw). Hamilton Co.: A. R. Moldenke 804 (Lw). Henry Co.: H. N. Moldenke 21910 (Lw). Madison Co.: A. R. Moldenke 802 (Lw). Pulaski Co.: Friesner 9768 (Lb--30184). Randolph Co.: H. N. Moldenke 21907 (Lw). IOWA: Adair Co.: A. R. Moldenke 938 (Lw). Buchanan Co.: A. R. Moldenke 986 (Lw). Cass Co.: H. N. Moldenke 21937 (Lw). Clayton Co.: A. R. Moldenke 988 (Lw). Delaware Co.: A. R. Moldenke 983 (Lw). Iowa Co.: A. R. Moldenke 971 (Lw). Johnson Co.: Huang 2580 (Lb--54991). Linn Co.: A. R. Moldenke 979 (Lw), 981 (Lw, Ut). Madison Co.: A. R. Moldenke 941 (Lw). Mahaska Co.: A. R. Moldenke 962 (Lw, Ut). Marion Co.: A. R. Moldenke 954 (Lw). Mills Co.: A. R. Moldenke 925 (Lw), 929 (Lw). Pottawatomie Co.: A. R. Moldenke 922 (Lw). Poweshiek Co.: A. R.

Moldenke 967 (Lw, Ut). Warren Co.: A. R. Moldenke 946 (Lw), 949 (Lw). MICHIGAN: Charlevoix Co.: A. R. Moldenke 1027 (Lw). Dickinson Co.: A. R. Moldenke 1026 (Lw). Grand Traverse Co.: Dieterle 1374 (S). Gratiot Co.: H. N. Moldenke 21945 (Lw). Ingham Co.: Collector undesignated s.n. [Lansing, 8-15-1887] (Lb—27612); A. R. Moldenke 1037 (Lw). Ionia Co.: H. N. Moldenke 21946 (Lw). Isabella Co.: A. R. Moldenke 1031 (Lw). Jackson Co.: A. R. Moldenke 1038 (Lw). Kent Co.: Daniels s.n. [Alto, Jul. 1898] (Lb—27611). Mecosta Co.: A. R. Moldenke 1030 (Lw). Menominee Co.: A. R. Moldenke 1024 (Lw). Montcalm Co.: A. R. Moldenke 1035 (Lw). Osceola Co.: A. R. Moldenke 1029 (Lw). Washtenaw Co.: A. R. Moldenke 1040 (Lw). Wayne Co.: A. R. Moldenke 1039 (Lw). WISCONSIN: Crawford Co.: A. R. Moldenke 1005 (Lw). Dane Co.: A. R. Moldenke 1008 (Lw); Rickett s.n. [Madison, July 14, 1926] (Lb--27604). Fond du Lac Co.: A. R. Moldenke 1014 (Lw). Grant Co.: A. R. Moldenke 1000 (Lw). Green Lake Co.: A. R. Moldenke 1016 (Lw). Iowa Co.: A. R. Moldenke 1004 (Lw). Marinette Co.: A. R. Moldenke 1022 (Lw). Oconto Co.: A. R. Moldenke 1023 (Lw). Outagamie Co.: A. R. Moldenke 1020 (Lw). Shawano Co.: A. R. Moldenke 1021 (Lw). Waupaca Co.: A. R. Moldenke 1019 (Lw). Waushara Co.: A. R. Moldenke 1018 (Lw). MINNESOTA: Becker Co.: Terrell 1777 (W—2388680). Ottertail Co.: P. Johnson 545 (Lb--36411). KANSAS: Brown Co.: A. R. Moldenke 913 (Lw). Cherokee Co.: E. L. Richards 1888 (Lw). Cheyenne Co.: W. H. Horr 4679 (Lw), 4697 (Lw); R. L. McGregor 13587 (Lw), 15221 (Lw). Comanche Co.: R. L. McGregor 14676 (Lw). Dickinson Co.: A. R. Moldenke 906 (Lw). Douglas Co.: R. L. McGregor 9668 (Lw), 14570 (Lw); J. D. Poindexter 33 (Lw), 229-13 (Lw). Ellis Co.: E. Runyon 280 (Lb—33195). Ellsworth Co.: B. L. Wagenknecht 1927 (Lw). Franklin Co.: Hetzer s.n. [24 Aug. 1949] (Lw); R. L. McGregor 12699 (Lw). Greenwood Co.: R. L. McGregor 14698 (Lw). Harper Co.: R. L. McGregor 14577 (Lw); A. R. Moldenke 890 (Lw). Jefferson Co.: W. H. Horr 4228 (Lw); A. R. Moldenke 905 (Lw). Kingman Co.: A. R. Moldenke 894 (Lw). Kiowa Co.: R. L. McGregor 15155 (Lw). Meade Co.: Fearing & Latham s.n. [August 17, 1950] (Lw); W. H. Horr 3302 (Lw), 3540 (Lw). Morris Co.: R. L. McGregor 14105 (Lw). Neosho Co.: W. H. Horr 6723 (Lw). Reno Co.: J. D. Poindexter 195-13 (Lw). Republic Co.: G. E. Morley 497 (Lw), 1062 (Lw). Rice Co.: R. L. McGregor 12545 (Lw). Stafford Co.: A. R. Moldenke 907 (Lw); Ungar 349 (Lw), 599 (Lw, Lw), 673 (Lw). Washington Co.: W. H. Horr 4436 (Lw), 4648 (Lw); R. L. McGregor 5025 (Lw). Woodson Co.: E. W. Lathrop 1211 (Lw). MISSOURI: Barton Co.: E. J. Palmer 54410 (Lb--50949). Bates Co.: A. R. Moldenke 891 (Lw). Benton Co.: A. R. Moldenke 862 (Lw). Boone Co.:

Daniels s.n. [Columbia, July 1903] (Lb--4193, Lb--4194, Lb--4195); Drouet 797 (Lb--12568), 846 (Lb--12183); Rickett s.n. [Centralia Rd., July 17, 1927] (Lb--7097, Lb--7098). Callaway Co.: Flaspohler 93 (Lb--51500). Grundy Co.: Crookshanks 147 (Lb--29603). Henry Co.: A. R. Moldenke 865 (Lw). Jasper Co.: Z. Williams s.n. [Jasper, Aug. 15, 1928] (Lb--4196). Lafayette Co.: Steyermark 83114 (Lb--45016). Lawrence Co.: E. J. Palmer 56661 (Lb--50950). Lincoln Co.: A. R. Moldenke 840 (Lw). Maries Co.: A. R. Moldenke 853 (Lw). Nodaway Co.: J. R. Singleton 179 (Lb--34594). Saint Louis Co.: Eggert s.n. [Aug. 15, 1877] (Lb--4192). Scotland Co.: Drouet s.n. [Sept. 7, 1931] (Lb--9465). NEBRASKA: Hall Co.: R. J. Lemaire 2284 (Lb--52671). Nemaha Co.: A. R. Moldenke 927 (Lw), 928 (Lw). Otoe Co.: A. R. Moldenke 926 (Lw). Richardson Co.: A. R. Moldenke 916 (Lw).

VERBENA HASTATA f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 9: 281--282. 1963; Steyerm., Fl. Mo. 1258, map 1841. 1963; Moldenke, Résumé Suppl. 11: 2. 1964; Moldenke, Phytologia 11: 341. 1965.

Steyermark (1963) records this form from Barton and Saint Louis Counties, Missouri, on the basis of specimens preserved in the herbarium of the Missouri Botanical Garden at St. Louis, not as yet seen by me.

VERBENA HASTATA f. CAERULEA Moldenke, Phytologia 10: 490. 1964.

Bibliography: Moldenke, Phytologia 10: 490 (1964) and 11: 201. 1964; Moldenke, Résumé Suppl. 11: 1. 1964.

This form differs from the typical form of the species in having pale-blue corollas.

The type of the form was collected by Andrew Ralph Moldenke (no. 1043) in a moist swale at Amherstburg, Essex County, Ontario, Canada, on August 28, 1964, and is deposited in the H. N. Moldenke Herbarium at Yonkers, New York. There were about six husky plants of this distinct color form growing among 100 of the normal form and 30 of f. rosea Cheney. Only the type specimen has been examined by me.

Citations: ONTARIO: Essex Co.: A. R. Moldenke 1043 (Z--type).

VERBENA HASTATA f. ROSEA Cheney

Additional bibliography: Steyerm., Fl. Mo. 1258, map 1841. 1963; Moldenke, Phytologia 10: 110. 1964; Moldenke, Résumé Suppl. 11: 1 & 2. 1964; Henry & Buker, Trillia 12: 125. 1964.

McGregor says of this form "scattered plants in moist ravine in bluestem prairie pasture; corolla roseate!" Steyermark (1963) records it from Livingston County, Missouri, based on a specimen preserved in the herbarium of the Missouri Botanical Garden at St. Louis, not as yet seen by me.

Additional citations: ONTARIO: Essex Co.: A. R. Moldenke 1042 (Z). IOWA: Warren Co.: A. R. Moldenke 950 (Lw). KANSAS: Franklin

Co.: R. L. McGregor 12700 (Lw, Lw).

VERBENA HASTATA var. SCABRA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 110 (1964) and 11: 201. 1964; Moldenke, Résumé Suppl. 10: 1 (1964) and 11: 2. 1964.

Recent collectors in Kansas have found this plant in broad ravines, the margins of ponds in prairies, and in sandy loam on creek banks. Harms calls it "scattered" in sandy loam of wide low area, Wagenknecht calls it "common" in sandy soil of low ground around edges of fields, and Poindexter reports the pollen fertility as 97 percent and the chromosome number as n= 7. Although the characters of this variety would appear to be an intensification of those seen in the "field form" of typical V. hastata mentioned above, the variety appears to inhabit the same wet habitats of the typical form rather than the dry pastureland habitat of the "field form".

Additional citations: WISCONSIN: Dodge Co.: A. R. Moldenke 1010 (Z). Jefferson Co.: A. R. Moldenke 1009 (Lw). KANSAS: Barber Co.: R. L. McGregor 14858 (Lw); J. D. Poindexter 201-3 (Lw). Rice Co.: V. L. Harms 903 (Lw). Scott Co.: V. L. Harms 1107 (Lw). Stafford Co.: B. L. Wagenknecht 3149 (Lw).

VERBENA HAYEKII Moldenke

Additional bibliography: Soukup, Biota 5: 134--135. 1964; Moldenke, Phytologia 10: 110 (1964) and 11: 252--256. 1965.

Soukup (1964) records the common name "cáncer ccora" for this plant.

VERBENA HIRTA Spreng.

Additional bibliography: Reitz, Sellowia 11: 57 & 134. 1959; Moldenke, Phytologia 10: 110 & 498 (1964) and 11: 239. 1965.

Additional citations: BRAZIL: Paraná: Hatschbach & Pereira 7941 [Herb. Hatschbach 10554] (Lw).

VERBENA HISPIDA Ruíz & Pav.

Additional bibliography: Kunth, Ind. Sem. Hort. Berol. 7. 1845; Hieron., Bol. Acad. Nac. Córdoba 4: 408. 1881; Hieron., Pl. Diaph. Fl. Argent. 214. 1882; Moldenke, Phytologia 10: 110, 145, 192, 210, & 296 (1964), 11: 21, 84, 86, 158, & 162 (1964), and 11: 336. 1965.

VERBENA HOOKERIANA (Covas & Schnack) Moldenke

Additional bibliography: Moldenke, Phytologia 10: 103 & 110—111. 1964.

VERBENA HUMIFUSA Cham.

Additional bibliography: Moldenke, Phytologia 10: 111, 127—129, 289, & 314. 1964.

xVERBENA HYBRIDA Voss

Additional synonymy: Verbena phlogiflora x coerulea Schwencke, Zytol. Untersuch. Verbenac. 15 & 27. 1931.

Additional bibliography: Schwencke, Zytol. Untersuch. Verbenac. 15 & 27. 1931; Irwin, Roadside Flow. Tex. 190. 1961; Moldenke, Résumé Suppl. 11: 4 & 8. 1964; A. & I. Nehrling, Pict Book Perenn. 131. 1964; Moldenke, Phytologia 10: 111, 311, 498, & 499 (1964), 11: 4 & 7 (1964), and 11: 265, 266, 284, & 290. 1965; Anon., Time 85 (5): 42. 1965.

Additional illustrations: A. & I. Nehrling, Pict. Book Perenn. 131. 1964.

Schwencke (1931) says "Da es sich bei V. phlogiflora x V. coerulea um einen als Gartenhybride gezüchteten Bastard handelt, ist die Ursache des Vorhandenseins der in grosser Anzahl auftretenden Zwergpollen in diesem Falle zum mindesten zweifelhaft....Die Tarpetenzellen lösen sich auf während die Pollen gefaltet sind."

It should be noted here that the name, V. hybrida Pech., is a synonym of xV. engelmannii Moldenke. The Agrelius, Hall, Lovejoy, & Maroney s.n. [8-18-18], distributed as xV. hybrida, is actually xV. perriana Moldenke.

Burpee has developed recently the "Miss Susie" variety of this hybrid with "two rows of petals".

Additional citations: HISPANIOLA: Dominican Republic: B. Augusto 1173 (N).

xVERBENA ILLICITA Moldenke

Additional bibliography: Steyerm., Fl. Mo. 1258, map 1842. 1963; Moldenke, Résumé Suppl. 10: 1 (1964) and 11: 1 & 2. 1964; Moldenke, Phytologia 10: 111 & 310 (1964), 11: 117, 196, 200, & 203 (1964), and 11: 328, 337, 338, & 342. 1965.

Poindexter reports the chromosome number of this plant as n= 7 and the pollen fertility as 39 percent on his no. 207-19 and 42 percent on his no. 207-22. He collected the plant in waste areas near old feed lots in overgrazed pastures in Cherokee County, Kansas. Horr found it "common" in dry loam of grassland in Washington County, while Morley describes it as "scattered" in creek bottoms in Republic County of the same state.

Additional citations: ILLINOIS: Macon Co.: A. R. Moldenke 820 (Lw). Pike Co.: A. R. Moldenke 833 (Lw, Ut, Z). IOWA: Iowa Co.: A. R. Moldenke 975 (Lw, Ut, Z). Madison Co.: A. R. Moldenke (Lw). WISCONSIN: Crawford Co.: A. R. Moldenke 995 (Lw, Ut). Iowa Co.: A. R. Moldenke 1003 (Lw). KANSAS: Atchison Co.: A. R. Moldenke 910 (Lw, Ut). Cherokee Co.: J. D. Poindexter 207-19 (Lw), 207-22 (Lw). Republic Co.: G. E. Morley 806 (Lw). Washington Co.: W. H. Horr 4435 (Lw). MISSOURI: Boone Co.: Rickett s.n. [Rock Bridge, July 9, 1927] (Lb—7095). Henry Co.: A. R. Moldenke 863 (Lw, Ut). Morgan Co.: B. F. Bush 12927 (Lb—13744).

VERBENA INCISA Hook.

Additional synonymy: Verbena incisa Schau. ex R. A. Phil., Anal.

Univ. Chil. 35: 191. 1870.
Additional bibliography: R. A. Phil., Anal. Univ. Chil. 35: 191. 1870; Moldenke, Résumé Suppl. 10: 7. 1964; Moldenke, Phytologia 10: 111, 128, 133, 136, 174, 289, 496--498, & 503 (1964), 11: 7 & 138—140 (1964), and 11: 266, 271, 279, 290, 315, & 320. 1965.

xVERBENA INHONESTA Moldenke
Additional bibliography: Moldenke, Phytologia 10: 112 (1964) and 11: 337. 1965.

VERBENA INTEGRIFOLIA Sessé & Moc.
Additional bibliography: Moldenke, Phytologia 10: 112 (1964) and 11: 158 & 162. 1964.

xVERBENA INTERCEDENS Briq.
Additional bibliography: Moldenke, Phytologia 10: 112 & 291 (1964) and 11: 86. 1964.

VERBENA INTERMEDIA Gill. & Hook.
Additional bibliography: Moldenke, Phytologia 10: 112 & 160 (1964), 11: 84 & 85 (1964), and 11: 322 & 323. 1965.
Additional citations: ARGENTINA: Corrientes: Pedersen 5435 (S, W—2432865).

xVERBENA KONDAI Moldenke
Additional bibliography: Moldenke, Phytologia 10: 112 (1964), 11: 47 (1964), and 11: 290. 1965.

VERBENA KUNTZEANA Moldenke
Additional bibliography: Moldenke, Phytologia 9: 387—388 (1963), 10: 132, 133, 175, & 499 (1964), and 11: 7. 1964.

VERBENA LACINIATA (L.) Briq.
Additional bibliography: Kunth, Ind. Sem. Hort. Berol. 7. 1845; Hieron., Bol. Acad. Nac. Córdoba 4: 409. 1881; Hieron., Pl. Diaph. Fl. Argent. 215. 1882; Muñoz Pizarro, Sin. Fl. Chil. 199—200. 1959; Sharma & Mukhopadhyay, Journ. Genet. 58: 359, 372, 377, & 384, pl. 12, fig. 53. 1963; Moldenke, Résumé Suppl. 10: 4. 1964; Moldenke, Phytologia 10: 112—113, 128, 136, 137, 146—148, 158, 186, 190, 194, 287, 294, 295, 299—301, 307, 310, & 311 (1964), 11: 7, 10, 22—25, 58, 62, 122, 123, 135, 181, 188, & 189 (1964), and 11: 245, 246, 249, 265—267, 270—273, 276, 279, 282—284, 286, 290, 291, 301, 315, 318, 320, & 321. 1965.
Additional illustrations: Sharma & Mukhopadhyay, Journ. Genet. 58: 384, pl. 12, fig. 53. 1963.
The corollas are described as "mauve" by Sharma & Mukhopadhyay (1963). Alvarez (1919) records the common name "sacha-alfa" for this plant, but indicates that it is also applied to V. tenera Spreng.
The Brücher & Brücher s.n. [Rio Pisavil, 30/1/49], cited below, was originally distributed as V. santiaguensis (Covas & Schnack)

Moldenke and was then cited by me as V. tenera Spreng. It is not conspecific with the other material gathered by these collectors and cited by me under V. cheitmaniana Moldenke.

Additional citations: ARGENTINA: Catamarca: Brücher & Brücher s.n. [Rio Pisavil, 30/1/49] (S).

VERBENA LACINIATA var. CONTRACTA (Lindl.) Moldenke

Additional bibliography: Moldenke, Phytologia 10: 113 (1964) and 11: 188 & 189. 1964.

VERBENA LACINIATA var. SABINI (Sweet) Moldenke

Additional bibliography: Moldenke, Phytologia 10: 113 (1964) and 11: 271. 1965.

VERBENA LANDBECKI R. A. Phil.

Additional bibliography: Muñoz Pizarro, Espec. Plant. Descr. Philippi 111. 1960; Moldenke, Phytologia 10: 113. 1964.

VERBENA LASIOSTACHYS Link

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1242. 1964; Moldenke, Phytologia 10: 113—114, 119, 140, 141, 186, 210, & 211 (1964), 11: 104—106, 127, 136, & 200 (1964), and 11: 241, 242, & 337. 1965.

In Shreve & Wiggins (1964) the distribution of this species is given as "In sandy or granitic soil of waste places, often in moist places along streams and canyons, mainly Upper Sonoran and Arid Transition Zones, northern Baja California to Oregon but barely entering the Sonoran Desert in eastern San Diego County, California. Introduced in New York."

VERBENA LASIOSTACHYS var. SCABRIDA Moldenke

Additional bibliography: Moldenke, Phytologia 9: 462, 466—467, & 469 (1964) and 11: 105 & 106. 1964.

VERBENA LASIOSTACHYS var. SEPTENTRIONALIS Moldenke

Additional bibliography: Moldenke, Phytologia 10: 210 & 211 (1964), 11: 105 (1964), and 11: 241. 1965.

Additional citations: CALIFORNIA: Ventura Co.: Holzwart & Detmers s.n. [Ojai Valley, May 5, 1929] (Lb—27616).

VERBENA LILACINA Greene

Additional bibliography: Moldenke, Phytologia 9: 175—177 (1963), 9: 473—474 (1964), 10: 114 (1964), and 11: 157. 1964; Hocking, Excerpt. Bot. A.7: 456. 1964.

VERBENA LINDMANII Briq.

Additional bibliography: Moldenke, Phytologia 9: 477—480 (1964) and 11: 121. 1964.

VERBENA LITORALIS H.B.K.

Additional & emended bibliography: Hieron, Bol. Acad. Nac. Cór-

doba 4: 408. 1881; Hieron, Pl. Diaph. Fl. Argent. 214. 1882; Augusto, Fl. Rio Grande do Sul 211, 214, 233, & 235, fig. 102. 1946; Muñoz Pizarro, Sin. Fl. Chil. 199. 1959; Reitz, Sellowia 13: 67 & 110. 1961; T. Mey., Op. Lillo. 10: 65 & 125. 1963; Soukup, Biota 5: 135. 1964; Moldenke, Biol. Abstr. 45: 8025. 1964; Moldenke, Phytologia 10: 114, 140, 151, 160, 182, 210, 217—219, 285, 291, 296, & 297 (1964), 11: 86, 128, 183, 186, & 188 (1964), and 11: 317, 322, & 323. 1965.

Alvarez (1919) records the common name "sange de Cristo" for this species, as he does also for V. peruviana (L.) Britton and V. bonariensis L. He writes the generic name with a lowercase initial letter. Soukup (1964) records the names "verbena" and "verbena del campo". The corolla is described as "blue" on McGregor, Harms, Robinson, R. del Rosario, & Segal 721 and on Alston 5430, and as "purple" on M. C. Carlson 3772. In Venezuela the species was collected by Alston in waste ground at 900 meters altitude; on Hawaii it was found by Carlson at 400 feet altitude. McGregor and his associates found it in an open moist meadow at 8000 feet altitude, but the specimen does not appear to be typical. In Mexico it was encountered by Breedlove on trails and on slopes with Quercus at 4800—5100 feet altitude.

Additional citations: MEXICO: Chiapas: Breedlove 6089 (Z), 6196 (Z). San Luis Potosí: McGregor, Harms, Robinson, R. del Rosario, & Segal 721 (Lw). VENEZUELA: Federal District: Alston 5430 (S, W-2440232). HAWAIIAN ISLANDS: Hawaii: M. C. Carlson 3772 (S). AUSTRALIA: New South Wales: Gray s.n. [Herb. Austral. 5377] (Lw).

VERBENA LITORALIS var. CARACASANA (H.B.K.) Briq.

Additional bibliography: Moldenke, Phytologia 10: 76—78 & 160. 1964.

VERBENA LOBATA Vell.

Additional & emended bibliography: Reitz, Sellowia 11: 57 & 134 (1959) and 13: 67 & 110. 1961; Moldenke, Phytologia 10: 79—82 (1964) and 11: 239, 243, & 245. 1965.

VERBENA LOBATA var. HIRSUTA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 82—83 & 132. 1964.

VERBENA LONGIFOLIA Mart. & Gal.

Additional bibliography: Moldenke, Phytologia 10: 83—85 & 140. 1964.

VERBENA MACDOUGALII Heller

Additional bibliography: Moldenke, Phytologia 10: 86—88, 114—118, & 307 (1964) and 11: 200 & 201. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1240. 1964; Moldenke, Résumé Suppl. 10: 7 (1964) and 11: 4. 1964; Moldenke, Biol. Abstr. 45: 8025. 1964.

Recent collectors have found this plant in the ponderosa pine forest in Arizona, while in New Mexico it has been encountered in small meadows in stands of yellow pine, with deciduous oaks, two scattered species of junipers, pinyon pine, and Pseudotsuga on the ridges, along running streams in canyons with meadows and clearings, in wet soil along streams with Abies, yellow pine, and quaking aspen, in pinyon-juniper formation and juniper-pinyon belt, in meadows and along streambanks, some in deeply shaded dells, and in association with pinyon-juniper and some oaks in primarily grassland but on reddish-brown soil. Material has been misidentified and distributed in herbaria as V. hastata L. Harms describes the plant as "numerous" in roadside clearings in ponderosa pine forests. In Shreve & Wiggins (1964) the distribution of the species is given as "In open places, mostly above the Lower Sonoran Zone, from southern Wyoming to western Texas, New Mexico, and Arizona; entering the Sonoran Desert at Mountain Park west of Tucson, Pima County, Arizona". The B. L. Wagenknecht 4809 distributed as this species is actually V. stricta Vent.

Additional citations: NEW MEXICO: Bernalillo Co.: Dunn & Gordon 45 (Lb--52464). Lincoln Co.: V. L. Harms 1802 (Lw). Otero Co.: D. B. Dunn 3157 (Lb--46329), 3179 (Lb--52468), 3217 (Lb--48536). San Miguel Co.: D. B. Dunn 6703 (Lb--39457). Torrance Co.: D. B. Dunn 6138 (Lb--38146), 6215 (Lb--41536). ARIZONA: Coconino Co.: Perdue 4119 (W--2422173).

VERBENA MARITIMA Small

Additional bibliography: Menninger, Seaside Pl. 35 & 54. 1964; Moldenke, Phytologia 10: 122--126 (1964) and 11: 263. 1965.

Menninger (1964) records the common name "beach verbena".

VERBENA MARRUBIOIDES Cham.

Additional & emended bibliography: Reitz, Sellowia 13: 67 & 110. 1961; Moldenke, Phytologia 10: 127--129, 289, & 498 (1964) and 11: 6 & 60. 1964.

VERBENA MEGAPOTAMICA Spreng.

Additional bibliography: Moldenke, Phytologia 10: 130--135, 174, 492, 493, 496--499, & 503 (1964), 11: 6, 134, 135, & 139 (1964), and 11: 290 & 318. 1965.

VERBENA MENDOCINA R. A. Phil.

Additional bibliography: Muñoz Pizarro, Espec. Plant. Descr. Philippi 111. 1960; Moldenke, Phytologia 10: 135--138, 186, 294, 295, 301, & 313 (1964), 11: 122 (1964), and 11: 284 & 290. 1965.

VERBENA MENTHAEFOLIA Benth.

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1238. 1964; Moldenke, Phytologia 10: 99, 102, 138--145, 182, 186, 210, 212, 218, 285, 304, & 502 (1964), 11: 27 & 128 (1964), and 11: 308. 1965.

The corolla is said to have been "blue" on McGregor, Harms, Robinson, R. del Rosario, & Segal 482 and "purple" on Fearing & Thompson 60. McGregor and his associates found the plant growing in slight depressions of dry rocky open range in San Luis Potosí and as a "local colony" near a small pond in Nuevo León. Fearing & Thompson found it in red clay soil of dense oak forests. In Shreve & Wiggins (1964) its range is given as "In bottomlands, ravines, streamsides, and along roadsides, Sonoran Zones, western edge of Colorado Desert to Texas and south into northern Baja California and Oaxaca."

Additional citations: MEXICO: Hidalgo: Fearing & Thompson 60 (Lw). Nuevo León: McGregor, Harms, Robinson, R. del Rosario, & Segal 492 (Lw). San Luis Potosí: McGregor, Harms, Robinson, R. del Rosario, & Segal 523 (Lw).

xVERBENA MERETRIX Moldenke

Additional bibliography: Moldenke, Phytologia 10: 145 & 210. 1964.

VERBENA MICROPHYLLA H.B.K.

Additional synonymy: Lantana microphylla Mart. in Mart. & Spix, Reise Bras. 2: 792. 1828.

Additional bibliography: Mart. & Spix, Reise Bras. 2: 792. 1828; Soukup, Biota 5: 135. 1964; Moldenke, Phytologia 10: 146—150 & 190--196 (1964), 11: 51 & 53 (1964), and 11: 273, 290, & 317. 1965.

Soukup (1964) records the common names "salvia de la Virgen" and "verbenita del campo" for this species in Peru.

VERBENA MINUTIFLORA Briq.

Additional bibliography: Moldenke, Phytologia 10: 150--151, 159, & 160. 1964.

xVERBENA MOECHINA Moldenke

Additional bibliography: Steyerm., Fl. Mo. 1260, map 1843. 1963; Moldenke, Phytologia 10: 151--157 (1964) and 11: 117, 164, 165, 180, 190, 195, 201, & 203. 1964; Moldenke, Résumé Suppl. 10: 1 (1964) and 11: 2. 1964.

Demaree found this hybrid growing on dry ridges in Arkansas.

Additional citations: KANSAS: Elk Co.: A. R. Moldenke 883 (Lw, Ut). Lyon Co.: W. H. Horr s.n. [Aug. 12, 1929] (Lw). Wilson Co.: W. H. Horr s.n. [July 12, 1930] (Lw). MISSOURI: Boone Co.: Daniels s.n. [July 1903] (Lb—4167). Phelps Co.: Rickett s.n. [Yancy Mills, Aug. 13, 1927] (Lb—4170). Saint Louis Co.: Favor s.n. [June 16, 1901] (Lb--4185), s.n. [June 17, 1901] (Lb—4186). Stone Co.: B. F. Bush 15697 (Lb—23407). ARKANSAS: Lawrence Co.: Demaree 5249 (N). Randolph Co.: Demaree 29179 (Lb--47029), 30963 (Lb--46745).

VERBENA MONTEVIDENSIS Spreng.

Additional bibliography: Moldenke, Phytologia 10: 122, 151, 158--161, 173, & 499 (1964), 11: 59, 155, & 186 (1964), and 11: 322 & 323. 1965.

Additional citations: BRAZIL: Paraná Hatschbach & Pereira 7827 [Herb. Hatschbach 10442] (Lw). ARGENTINA: Corrientes: Pedersen 5074 (W--2432703, W--2432708).

VERBENA MORICOLOR Moldenke

Additional bibliography: Moldenke, Phytologia 10: 133 & 173--174 (1964) and 11: 139. 1964.

VERBENA MULTICAULIS Raf.

Additional bibliography: Moldenke, Phytologia 10: 174 (1964) and 11: 180. 1964.

VERBENA NANA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 175--176 (1964) and 11: 139. 1964.

VERBENA NEOMEXICANA (A. Gray) Small

Additional bibliography: Moldenke, Phytologia 10: 99, 140, 176--189, 192, 193, 210, 218, 285, 296, 303, 304, 306, & 502 (1964), 11: 13--15, 18, & 111 (1964), and 11: 315, 316, & 337. 1965.

VERBENA NEOMEXICANA var. HIRTELLA Perry

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1241. 1964; Moldenke, Phytologia 10: 140, 180--184, 186, 218, 285, 304, & 306 (1964), 11: 13 & 14 (1964), and 11: 341. 1965.

In Shreve & Wiggins (1964) the distribution of this variety is given as "In dry arroyos, plains and rocky hillsides, often in shaded situations, Lower Sonoran to Arid Transition Zones, Gila County, Arizona, to Texas, Nuevo León, and at least to vicinity of El Mármol, Baja California."

VERBENA NEOMEXICANA var. XYLOPODA Perry

Additional bibliography: Moldenke, Phytologia 10: 140, 182--189, 218, 285, 306, & 502 (1964) and 11: 111. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1241. 1964.

In Shreve & Wiggins (1964) the distribution of this variety is given as "In sandy soil on hillsides, mountain valleys, dry plains, open, dry rocky slopes, and along moist streamsides, Lower Sonoran to Arid Transition Zones, southern California to Texas, San Luis Potosí, and northern Baja California. Introduced in Florida."

xVERBENA NEQUAM Moldenke

Additional bibliography: Moldenke, Phytologia 10: 186 (1964) and 11: 290. 1965.

xVERBENA NISA Moldenke

Additional bibliography: Moldenke, Phytologia 10: 189--190 & 301

(1964) and 11: 290. 1965.

VERBENA NIVEA Moldenke
Additional bibliography: Moldenke, Phytologia 10: 147, 148, & 190—192. 1964.

VERBENA NIVEA f. ROSEA Moldenke
Additional bibliography: Moldenke, Phytologia 10: 147 & 191—192. 1964.

xVERBENA NOTHA Moldenke
Additional bibliography: Moldenke, Phytologia 10: 178 & 192—193. 1964.

VERBENA OCCULTA Moldenke
Additional bibliography: Soukup, Biota 5: 135. 1964; Moldenke, Phytologia 10: 193—194. 1964.

Soukup (1964) records the common name "verbenita del campo" for this species. Saunders describes the flowers as "deepish mauve....outer surface of petals mauvish-white" on his no. 961 and "as for 961 but with considerably lighter flowers" on his no. 962. He describes the leaves as "dark green, shiny on upper surface, lighter green with fine white hairs beneath."

Additional citations: PERU: La Libertad: López & Sagastegui 2718 (W—2430832); G. E. Saunders 961 (Z), 962 (Z).

VERBENA OFFICINALIS L.
Additional synonymy: Verbena aubrietii Kern., in herb.

Additional & emended bibliography: Charany, Journ. de Chim., ser. 7, 2: 292—298. 1910; Lond. Chem. Soc. Journ. 98: 991. 1910; Chem. Abstr. 5: 2525. 1911; Schnarf, Ost. Bot. Zeitschr. 74: 41 & 45. 1925; Schnarf in Linsb., Handb. Pflanzenanat. 10 (2): 233, 345, & 380. 1929; Schwencke, Zytol. Untersuch. Verbenac. 6—10, 19, 21—23, 31, & 33—34, fig. 1—4 & 16—26. 1931; Patermann, Beitr. Zytol. Verbenac. 8, 10, 43, & 47. 1935; Bider, Beitr. Pharmakog. Borag. 95—98, pl. 7, fig. 1. 1935; Oppenheimer & Evenari, Bull. Soc. Bot. Genev. 31: 363. 1941; Oppenheimer & Evenari, Florul. Cisiord. 363. 1948; M. L. Buch, U. S. Dept. Agr. Agric. Handb. 64: 13. 1960; Irwin, Roadside Flow. Tex. 190. 1961; Hatusima, Mem. South. Indust. Sci. Inst. Kagoshima Univ. 3 (1): 31. 1962; Moldenke, Résumé Suppl. 11: 5 & 8. 1964; Moldenke, Phytologia 10: 138, 140—142, 145, 176—178, 182, 186, 194—236, 271—282, 285, 307, 311, & 502 (1964), 11: 55, 86, 102, 103, 111, 113, 117, 128, 164, 200, & 203 (1964), and 11: 241, 242, 256, 257, 273, 290, 304, 310, 336, 340, & 341. 1965.

Additional illustrations: Schnarf, Ost. Bot. Zeitschr. 74: 41. 1925; Schwencke, Zytol. Untersuch. Verbenac. fig. 1—3 & 16—26. 1961; Bider, Beitr. Pharmakog. Borag. 97, pl. 7, fig. 1. 1935.

Charany (1910) and Buch (1960) report the presence of chlorogenic acid in the leaves of this species. Both Schwencke (1931) and Patermann (1935) report the haploid chromosome number of this

species as n= 6. Reitz (1959) reports the species as cultivated in Brazil. Hatusima (1962) records it from the Amami Islands.

The W. H. Duncan 20214, Seymour & Earle 109, and J. Skehan s. n. [Ocean Springs, 1892], distributed as V. officinalis, are all V. halei Small; Gordon & Dunn 878 is V. perennis Wooton; and Crookshanks 142 is xV. perriana Moldenke.

VERBENA OFFICINALIS var. ALBIFLORA Strobl

Additional bibliography: Moldenke, Phytologia 10: 212 & 277—278. 1964.

VERBENA OFFICINALIS var. GAUDICHAUDII Briq.

Additional bibliography: Moldenke, Phytologia 10: 217 & 279—280. 1964.

VERBENA OFFICINALIS var. GRANDIFLORA Hausskn.

Additional bibliography: Moldenke, Phytologia 10: 217 & 280. 1964.

VERBENA OFFICINALIS var. MACROSTACHYA (F. Muell.) Benth.

Additional bibliography: Moldenke, Phytologia 10: 212 & 280—281. 1964.

VERBENA OFFICINALIS var. PROSTRATA Gren. & Godr.

Additional bibliography: Moldenke, Phytologia 10: 217, 218, 229, & 281—282 (1964) and 11: 257. 1965.

VERBENA ORCUTTIANA Perry

Additional bibliography: Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1240. 1964; Moldenke, Phytologia 10: 182, 218, & 284—286 (1964) and 11: 128. 1964.

In Shreve & Wiggins (1964) the distribution of this species is given as "On tablelands and mountains, dry flats, and the margins of dry pools, Sonoran Zones, northeastern Baja California."

VERBENA ORIGENES R. A. Phil.

Additional synonymy: Verbena origens R. A. Phil., Anal. Mus. Nac. Bot. 2: 58. 1891.

Additional bibliography: R. A. Phil., Anal. Mus. Nac. Bot. 2: 58. 1891; Muñoz Pizarro, Sin. Fl. Chil. 199 & 200. 1959; Muñoz Pizarro, Espec. Plant. Descr. Philippi 110 & 111. 1960; Moldenke, Phytologia 10: 286—288. 1964; Moldenke, Résumé Suppl. 11: 8. 1964.

According to Muñoz Pizarro (1960) the type of V. origenes was "encontró en los más altos Andes de Coquimbo, en la cerro del Toro. Herb. Chil. no. 1906" by Gay, while that of V. origens was "Colectada en la quebrada de Paipote, Atacama." It seems to me that the names are just accidental orthographic variants of each other.

xVERBENA OSTENI Moldenke

Additional bibliography: Phytologia 10: 288—289 (1964) and 11: 7. 1964.

VERBENA PARAGUARIENSIS Moldenke
Additional bibliography: Moldenke, Phytologia 10: 292 & 504. 1964.

VERBENA PARODII (Covas & Schnack) Moldenke
Additional bibliography: Moldenke, Phytologia 10: 293--295 & 313 (1964) and 11: 123. 1964.

VERBENA PAULSENI R. A. Phil.
Additional bibliography: Muñoz Pizarro, Espec. Plant. Descr. Philippi 111. 1960; Moldenke, Phytologia 10: 298--299. 1964.

VERBENA PERAKII (Covas & Schnack) Moldenke
Additional bibliography: Moldenke, Phytologia 10: 189--190, 295, & 299--301 (1964), 11: 122 (1964), and 11: 280 & 290. 1965.

VERBENA PERENNIS Wooton
Additional bibliography: Moldenke, Phytologia 10: 183 & 301--306 (1964) and 11: 13. 1964.

Gordon & Norris found this species in "occasional oak, pinyon pine and juniper, mostly grassland cultivated" in Otero County, New Mexico, while Gordon & Dunn found it "in canyon with black walnuts along creek bed, sparse juniper on hillsides, poor grassland in open places" in Lincoln County. Material has been misidentified and distributed in herbaria as V. officinalis L.

Additional citations: NEW MEXICO: Lincoln Co.: Gordon & Dunn 878 (Lb--40886). Otero Co.: Gordon & Norris 549 (Lb--54095).

xVERBENA PERRIANA Moldenke
Additional bibliography: Steyerm., Fl. Mo. 1261. 1963; Moldenke, Résumé Suppl. 11: 1 & 2. 1964; Moldenke, Phytologia 10: 210, 218, & 307--313 (1964), 11: 117 & 202 (1964), and 11: 336. 1965.

Steyermark (1963) says "A specimen from Grundy County (pastures, July 28, 1937, D. R. Crookshanks 142, in U. Mo. Herb.) appears to be a hybrid between V. bracteata and V. hastata." I have examined this specimen, originally identified as V. officinalis L., and find it to be xV. perriana.

Additional citations: IOWA: Mills Co.: A. R. Moldenke 918 (Lw). Pottawatomie Co.: A. R. Moldenke 932 (Lw). MISSOURI: Grundy Co.: Crookshanks 142 (Lb--29613).

xVERBENA PERTURBATA Moldenke
Additional bibliography: Moldenke, Phytologia 10: 295 & 313. 1964.

VERBENA PERUVIANA (L.) Britton
Additional bibliography: Soukup, Biota 5: 135. 1964; Moldenke, Phytologia 10: 175, 288, 289, 301, 313, 319, 490, 491, 496--498, & 504 (1964), 11: 3, 6, 7, 9, 24, 25, 86, 134, 135, 139, 140, & 181 (1964), and 11: 272, 273, 280, 290, 320, & 321. 1965.

Soukup (1964) records the common name "melindres colorado" and "pampas" for this plant.

VERBENA PHLOGIFLORA Cham.

Additional bibliography: Moldenke, Résumé Suppl. 11: 8. 1964; Moldenke, Phytologia 10: 492--501 (1964), 11: 27, 86, 138, & 140 (1964), and 11: 290. 1965.

VERBENA PHLOGIFLORA f. ALBA Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 27: 2026. 1953; Moldenke, Phytologia 10: 501. 1964.

VERBENA PINETORUM Moldenke

Additional bibliography: Moldenke, Phytologia 10: 501--503. 1964; Langman, Select. Guide Lit. Flow. Pl. Mex. 516 & 1010. 1964.

VERBENA PINNATILOBA (Kuntze) Moldenke

Additional bibliography: Moldenke, Phytologia 10: 498 & 503. 1964.

VERBENA PLATENSIS Spreng.

Additional bibliography: Spector, Handb. Biolog. Data 186. 1956; Moldenke, Phytologia 10: 503--504 (1964) and 11: 1--11, 24, 25, & 86. 1964.

Spector (1956) reports on the temperature effect on the life span of seeds of this species stored in sealed containers. With a moisture content of 6 percent, the median life span is 3 years and the maximum life span is 6 years at 24° C. At 5° C. the median life span is 9 years and the maximum life span is 13 years; while at minus 4° C. the median and maximum life span is 15 years.

VERBENA PLATENSIS f. VIOLACEA Moldenke

Additional bibliography: Moldenke, Phytologia 11: 6 & 10--11. 1964.

VERBENA PLICATA Greene

Additional bibliography: Moldenke, Résumé Suppl. 11: 3. 1964; Moldenke, Phytologia 11: 11--18, fig. 13. 1964.

VERBENA PLICATA var. DEGENERI Moldenke

Additional bibliography: Moldenke, Phytologia 11: 13, 14, & 18--19. 1964.

VERBENA PORRIGENS R. A. Phil.

Additional bibliography: Moldenke, Phytologia 11: 20--21 (1964) and 11: 245 & 246. 1965.

VERBENA PULCHELLA Sweet

Additional bibliography: Moldenke, Phytologia 11: 21--26 & 46 (1964) and 11: 269--271, 273, 277, 278, & 290. 1965.

VERBENA PULCHRA Moldenke
Additional bibliography: Moldenke, Phytologia 11: 26--28 & 139. 1964.

VERBENA PUMILA Rydb.
Additional bibliography: Moldenke, Résumé Suppl. 11: 3. 1964; Moldenke, Phytologia 11: 28--41, 43, 44, 48, 100, & 158, fig. 14 (1964) and 11: 283, 290, 308, & 326. 1965.

VERBENA PUMILA f. ALBIDA Moldenke
Additional bibliography: Hocking, Excerpt. Bot. A.7: 455. 1964; Moldenke, Phytologia 9: 188 (1963) and 11: 32, 39--41, & 43. 1964.

VERBENA QUADRANGULATA Heller
Additional bibliography: Moldenke, Résumé Suppl. 11: 8. 1964; Moldenke, Phytologia 11: 30, 32, 33, 39--46, & 48. 1964.
The "Verbena quandrangulata" cited by me as having been published in synonymy in my Résumé Suppl. 11, page 7, was actually published on page 8 of that work.

VERBENA RACEMOSA Eggert
Additional bibliography: Moldenke, Phytologia 11: 21, 23, 32, 43, & 46--50 (1964) and 11: 290. 1965.

VERBENA RADICATA Moldenke
Additional bibliography: Hocking, Excerpt. Bot. A.7: 454. 1964; Moldenke, Phytologia 11: 50--52 (1964) and 11: 249, 252, 273, & 317. 1965.

VERBENA RADICATA var. GLABRA (Hicken) Moldenke
Additional bibliography: Moldenke, Phytologia 11: 52. 1964; Hocking, Excerpt. Bot. A.7: 454. 1964.

VERBENA RECTA H.B.K.
Additional bibliography: Moldenke, Phytologia 11: 54--56 (1964) and 11: 327. 1965.

VERBENA REICHII Acevedo de Vargas
Additional bibliography: Acevedo de Vargas, Rev. Chil. Hist. Nat. 54: 45. 1954; Moldenke, Phytologia 11: 57--58. 1964.
I am grateful to my friend, Benkt Sparre, for calling my attention to the fact that Acevedo de Vargas (1953) has emended her original discussion of this species by stating that Reiche collected the type in the Cordillera de Santiago at 2500 meters altitude in January, 1892.

VERBENA RIBIFOLIA var. FOETIDA (R. A. Phil.) Acevedo de Vargas
Additional bibliography: Moldenke, Phytologia 11: 60 & 61. 1964.

VERBENA RIGIDA Spreng.
Additional bibliography: Moldenke, Phytologia 10: 499 (1964), 11:

62—68, 80—99, 127, 158, 162, & 190, fig. 15 (1964), and 11: 266, 322, & 323. 1965.

VERBENA RIGIDA var. LILACINA (Benary & Bodger) Moldenke
Additional bibliography: Moldenke, Phytologia 11: 81 & 96—97. 1964.

VERBENA RIGIDA var. OBOVATA (Hayek) Moldenke
Additional bibliography: Moldenke, Phytologia 11: 87 & 97—98. 1964.

VERBENA RIGIDA var. REINECKII (Briq.) Moldenke
Additional bibliography: Moldenke, Phytologia 11: 84—86 & 98—99. 1964.

VERBENA RINCONENSIS Moldenke
Additional bibliography: Hocking, Excerpt. Bot. A.7: 454. 1964; Moldenke, Phytologia 11: 99—100. 1964.

VERBENA RIPARIA Raf.
Additional bibliography: Moldenke, Phytologia 11: 100—103 (1964) and 11: 336. 1965.

VERBENA ROBUSTA Greene
Additional bibliography: Moldenke, Phytologia 11: 103—108 & 201. 1964.

VERBENA RUGOSA Mill.
Additional bibliography: Moldenke, Phytologia 11: 108—109, 158, & 190. 1964.

VERBENA RUSSELLII Moldenke
Additional bibliography: Langman, Select. Guide Lit. Flow. Pl. Mex. 516 & 1010. 1964; Moldenke, Phytologia 11: 112—113. 1964.

xVERBENA RYDBERGII Moldenke
Additional bibliography: Moldenke, Phytologia 11: 113—120, 190, 195, 196, & 200—203. 1964.

VERBENA SANTIAGUENSIS (Covas & Schnack) Moldenke
Additional bibliography: Moldenke, Phytologia 11: 121—123 & 135 (1964) and 11: 273 & 290. 1965.

VERBENA SCABRA Vahl
Additional bibliography: Moldenke, Phytologia 11: 84, 86, 102, & 123—133 (1964) and 11: 336, 342, 344, & 346. 1965.

VERBENA SESSILIS (Cham.) Kuntze
Additional bibliography: Moldenke, Phytologia 11: 141—142, 155—156, 185, & 186. 1964.

VERBENA SHREVEI Moldenke

Additional bibliography: Langman, Select. Guide Lit. Flow. Pl. Mex. 516. 1964; Moldenke, Phytologia 11: 157--158. 1964.

VERBENA SIMPLEX Lehm.
Additional bibliography: Moldenke, Phytologia 11: 158--181, 190, & 201--203, fig. 16 (1964) and 11: 328, 340, & 341. 1965.

VERBENA SIMPLEX f. ALBIFLORA Moldenke
Additional bibliography: Moldenke, Phytologia 11: 164 & 179--180. 1964.

VERBENA SIMPLEX var. EGGERTI Moldenke
Additional bibliography: Moldenke, Phytologia 11: 164, 165, & 180--181. 1964.

xVERBENA SOLBRIGII Moldenke
Additional bibliography: Moldenke, Phytologia 11: 181 (1964) and 11: 290. 1965.

VERBENA STELLARIOIDES Cham.
Additional bibliography: Moldenke, Phytologia 11: 155 & 184--187 (1964) and 11: 322--324. 1965.

VERBENA STRICTA Vent.
Additional bibliography: Moldenke, Phytologia 11: 158, 162--164, & 190--213, fig. 17 (1964) and 11: 219--238, 328, 337, 339, 341, & 342. 1965.

VERBENA STRICTA f. ALBIFLORA Wadmond
Additional bibliography: Moldenke, Phytologia 11: 200--203 (1964) and 11: 232--237. 1965.

VERBENA STRICTA f. ROSEIFLORA Benke
Additional bibliography: Moldenke, Phytologia 11: 201--203 (1964) and 11: 235--238. 1965.

VERBENA SULPHUREA D. Don
Additional bibliography: Moldenke, Phytologia 11: 242--251 & 290. 1965.

VERBENA SULPHUREA f. ALBA Moldenke
Additional bibliography: Moldenke, Phytologia 11: 246--248. 1965.

VERBENA SULPHUREA var. CANESCENS R. A. Phil.
Additional bibliography: Moldenke, Phytologia 11: 246 & 248. 1965.

VERBENA SULPHUREA f. FUSCORUBRA Skottsberg
Additional bibliography: Moldenke, Phytologia 11: 246 & 248--249. 1965.

VERBENA SULPHUREA var. TALTALENSIS Moldenke
Additional bibliography: Moldenke, Phytologia 11: 246 & 251. 1965.

VERBENA SUPINA f. ERECTA Moldenke
Additional bibliography: Moldenke, Phytologia 11: 257 & 259--260. 1965.

VERBENA TAMPENSIS Nash
Additional bibliography: Moldenke, Phytologia 11: 262--264 & 290. 1965.

xVERBENA TEASII Moldenke
Additional bibliography: Moldenke, Phytologia 11: 264--267, 284, & 290. 1965.

VERBENA TENERA Spreng.
Additional bibliography: Moldenke, Phytologia 11: 267--280, 284, 290, 291, 302, 312, & 320. 1965.

VERBENA TENERA var. MAONETTI Regel
Additional bibliography: Moldenke, Phytologia 11: 272, 273, 276--280, 290, & 321. 1965.

VERBENA TENUISECTA Briq.
Additional bibliography: Moldenke, Phytologia 11: 290--304, 318, 320, & 321, fig. 18. 1965.

VERBENA TENUISECTA var. ALBA Moldenke
Additional bibliography: Moldenke, Phytologia 11: 291 & 301--303. 1965.

VERBENA TEUCRIIFOLIA var. COROLLULATA Perry
Additional bibliography: Moldenke, Phytologia 11: 308 & 310--311. 1965.

xVERBENA TORPA Moldenke
Additional bibliography: Moldenke, Phytologia 11: 315--316 & 337. 1965.

xVERBENA TRANSITORIA Moldenke
Additional bibliography: Moldenke, Phytologia 11: 290 & 318. 1965.

xVERBENA TRINITENSIS Moldenke
Additional bibliography: Moldenke, Phytologia 11: 290 & 320--321. 1965.

VERBENA VALERIANOIDES H.B.K.
It should be noted here that the Verbena valerianoides of Saint-Hilaire is a synonym of V. ephedroides Cham.

In all, 14 herbarium specimens and 2 mounted phototypes of this species have been examined by me.

Citations: COLOMBIA: Boyacá: Barclay & Juajibioy 7632 (N); Langenheim 3367 (Ca--78027). Cundinamarca: Apolinaire-Marie 706 (Mg--50); Hartweg 1350 (Br, Lu, N); Holton 507 (T); Humboldt & Bonpland s.n. [Macbride photos 39476] (Kr—photo of type, N—photo of type); F. W. Pennell 2329 (N, W--1042255), 2475 (N, W—1042312); M. Schneider 437 (S); Triana 2052 (Bm). Nariño: Triana s.n. [Pasto, 1853] (Bm).

VERBENA VARIABILIS Moldenke, Bot. Gaz. 106: 164. 1944.

Bibliography: Moldenke, Bot. Gaz. 106: 162 & 164. 1944; Moldenke, Alph. List Cit. 3: 728 (1949) and 4: 1078. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 74 & 200. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 85 & 474. 1959.

Perennial herb, 0.5—1 m. tall; stems tough, subterete or slightly tetragonal, lightly puberulent-strigillose, glabrescent toward the base, stramineous; branches short, very slender, more or less puberulent-strigillose; principal internodes 3--5 cm. long; leaves sessile, decussate-opposite or approximate, rather uniformly green on both surfaces, 2—3 cm. long, 1--2 cm. wide, the lower ones and those on the stems in general 3-parted with broad segments, each segment entire or with 1—3 large lobes, those on the branches 3-parted with very narrow, linear, pinnatisect segments, the lobes blunt at the apex, all strigillose on both surfaces, revolute along the margins; peduncles slender, 2.5--9.5 cm. long, more or less strigillose-puberulent, especially toward the apex, usually with 1 or 2 pairs of much reduced tripartite bracts near the apex and at the midpoint; spikes 2--5 cm. long, densely many-flowered; rachis densely spreading-puberulent; bractlets lanceolate, about 5 mm. long, long-acuminate at the apex, densely glandular-puberulent with erect spreading hairs; calyx about as long as the subtending bractlet, thin-textured, lightly glandular-puberulent; corolla light-purple, white within, reddish-pink at the base, its tube somewhat exserted from the calyx.

The type of this species was collected by R. D. Metcalf (no. 30255) in moist clay soil in good open drainage near Córdova, at an altitude of 3050 to 3300 meters, in the province of Castrovirreina, Huancavelica, Peru, on March 27 or 28, 1942, and is deposited in the United States National Herbarium at Washington. The roots are used by the local Amerinds against fleas.

The species is known to me thus far only from the type collection. In all, 2 herbarium specimens, including the type, and one mounted photograph have been examined by me.

Citations: PERU: Huancavelica: R. D. Metcalf 30255 (Ca--694968—isotype, N--photo of type, W—1834978--type).

VERBENA VENTURII Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 79. 1942.

Bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 44, 79, & 102. 1942; Moldenke, Castanea 13: 119. 1948; Moldenke, Alph. List Cit. 2: 375 (1948) and 4: 1088, 1091, 1092, & 1293. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 107 & 200. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Résumé 128 & 474. 1959; Moldenke, Résumé Suppl. 6: 7. 1963; Moldenke, Phytologia 9: 397. 1964.

Herb; stems ascending, herbaceous, tetragonal, rather densely hirsute with spreading white hairs of various lengths; nodes not annulate; principal internodes 1.5--3 cm. long; leaves decussate-opposite, often with fascicles of smaller ones on abbreviated twigs in their axils; petioles 5--10 mm. long, spreading-hirsute like the branches, alate-margined; leaf-blades membranous, uniformly green on both surfaces, ovate in outline, 1.5--3 cm. long, 1--2.5 cm. wide, deeply 3-parted, the divisions each again incised and many-lobed with obtuse or subacute lobes, densely spreading-hirsute with white stiff hairs on both surfaces; midrib and secondaries flat above, prominulous beneath; inflorescence terminal; peduncles 4.5--6 cm. long, spreading-hirsute with stiff white hairs like the stems; spikes densely many-flowered, 3--3.5 cm. long and wide in anthesis (including the corollas); bractlets lanceolate, about 3 mm. long and 1 mm. wide, sharply acute at the apex, the margins long-ciliate with stiff white antrorse hairs; calyx narrow-tubular, 6--7 mm. long, about 1 mm. wide, densely spreading-pubescent or hirsutulous, its rim very shortly and obscurely toothed; corolla hypocrateriform, violet or rose-lilac, its tube 10--13 mm. long, glabrous on the outside, the limb 6--9 mm. wide.

The type of this species was collected by Santiago Venturi (no. 949) — in whose honor it is named — on islands in and on the sandy banks of the river at Duraznilo, at an altitude of 600 meters, on the Río Sali, dept. Capital, Tucumán, Argentina, on September 3, 1920, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species has also been collected in sandy soil, on campos, and on sandy campos, at altitudes from 450 to 900 meters, blooming in January, March, July, September, and December. Material has been misidentified and distributed in herbaria under the name V. erinoides Lam.

In all, 18 herbarium specimens, including the type, and 4 mounted photographs have been examined by me.

Citations: ARGENTINA: Córdoba: E. Fielding s.n. [Cordova] (Bm). Jujuy: R. E. Fries 296 (N, S, S). La Rioja: Venturi 7840 [Herb. Osten 20863] (Du--372482, Gg--166779, Ug, W--1443307, W--1591393). Salta: Schreiter 9472 [Herb. Osten 22898] (Ug); Venturi 3677 (W--1591278), 10301 (Bm, N, S). Tucumán: Venturi 949 [Herb. Osten 17243; Herb. Inst. Miguel Lillo 31731] (F--photo of type, N--type, N--photo of type, Si--photo of type, Ug--isotype, W--1591235--isotype, Z--photo of type), 2441 [Herb. Osten 17256] (Ug).

VERBENA VILLIFOLIA Hayek in Engl., Bot. Jahrb. 42: 164--165. 1908.

Bibliography: Hayek in Engl., Bot. Jahrb. 42: 164—165. 1908;

Prain, Ind. Kew. Suppl. 4: 245. 1913; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 35 & 102 (1942) and [ed. 2], 74 & 200. 1949; Moldenke, Alph. List Cit. 3: 688 (1949) and 4: 1112 & 1167. 1949; Moldenke, Inform. Mold. Set 51 Spec. 4. 1956; Moldenke, Résumé 85 & 474. 1959; Moldenke, Résumé Suppl. 6: 6. 1963; Moldenke, Phytologia 9: 296 (1963) and 10: 103 & 110. 1964.

Small shrublet; branches prostrate, the youngest parts densely villous; leaves decussate-opposite, cuneately trifid, gradually attenuate into a short petiole at the base, appressed-villous on both surfaces, the middle lobe cuneate and 3-lobulate at the apex, the lateral lobes 2-lobulate; midrib and secondaries prominent beneath; spikes terminal, subsessile, dense, few-flowered, at first fastigiate, later becoming shortly cylindric, the rachis villous; bractlets ovate-lanceolate, longer than the calyx, acute at the apex, villous; calyx about 4 mm. long, appressed-pilose, 5-dentate, accrescent in fruit; corolla rose or lilac to violet or even whitish, only slightly longer than the calyx; upper anthers not appendaged; cocci testaceous, about 3 mm. long, scrobiculate-rugose.

The type of this diminutive species was collected by August Weberbauer (no. 2582) along a roadside at about 3900 meters altitude at La Oroya, Junín, Peru, and was deposited in the herbarium of the Botanisches Museum at Berlin, now destroyed, but where it was fortunately photographed by Macbride as his type photograph no. 17458. Hayek (1908) says of it: "Ein kleines Spalierstrauchlein aus der nächsten Verwandtschaft der V. inflata Kth., im Habitus aber der V. microphylla sehr ähnlich, aber durch die dichte Behaarung und den Mangel eines Konnektivanhängsels leicht zu unterschieden. Von V. inflata, der sie sich in der Ausbildung des Kelches am meisten nähert, ist sie durch den Wachs, die viel weniger tief geteilten Blätter und die dichte Behaarung verschieden. Sehr nahe scheint sie auch der mir unbekannten V. pogonostoma Walp. zu stehen, doch hat letztere nach der Beschreibung schmälere, fiederspaltige Blattabschnitte und sich nach dem Verblühen stark verlängernde Inflorescenzen."

Verbena villifolia inhabits grassy steppes at altitudes of 10,000 to 13,000 feet, and has been collected in anthesis in March, April, September, and November, in fruit in September. Material has been misidentified and distributed in herbaria as V. cuneifolia Ruíz & Pav. and as V. hispida Ruíz & Pav. The Asher, Kates, & Cia. 18003, cited below, is referred here only doubtfully.

In all, 9 herbarium specimens and 2 mounted photographs of the type collection have been examined by me.

Citations: PERU: Ancash: Cerrate 2567 (Ok). Cuzco: Rose & Rose 19072 (W--761654). Huancavelica: Tovar 743 (Z), 1194 (Ss). Junín: A. S. Kalenborn 22a (W--1044270); Kunkel 372 (Gg); F. L. Stevens 7 (W--1199960); Weberbauer 2582 [Macbride photos 17458] (Kr--photo of type, N--photo of type). Department undetermined: Asher, Kates, & Cia. 18003 (Kr); Collector undesignated s.n. (N).

VERBENA WEBERBAUERI Hayek in Engl., Bot. Jahrb. 42: 163. 1908.

Bibliography: Hayek in Engl., Bot. Jahrb. 42: 163. 1908; Prain, Ind. Kew. Suppl. 4: 245. 1913; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 35 & 102. 1942; Moldenke, Castanea 13: 116 & 117. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 43 & 44. 1948; Moldenke, Alph. List Cit. 3: 688 (1949) and 4: 1112 & 1191. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 74, 98, & 200. 1949; Soukup, Biota 1: 181. 1956; Moldenke, Résumé 85, 115, & 474. 1959; Moldenke, Résumé Suppl. 8: 2. 1964; Moldenke, Phytologia 10: 148. 1964.

Very small shrublet; roots woody; stems appressed to the ground, 5--10 cm. long, simple or branched; leaves decussate-opposite; leaf-blades ovate, small, 10--15 mm. long, obtuse at the apex, incised-crenate-serrate along the margins, covered with strong appressed setae on both surfaces; spikes cylindric, 2--3 cm. long, dense; bractlets ovate-lanceolate, shorter than the calyx, acute at the apex, setose-hispid; calyx ovate, 2--3 mm. long, shortly 5-toothed; corolla small, lilac or bluish-white, 3--4 mm. long, setose-puberulent on the outside.

The type of this tiny species was collected by August Weberbauer (no. 440) -- in whose honor it is named -- in open mats at 3700 meters altitude at Pucará, a station on the Puno--Cuzco railroad, and was deposited in the herbarium of the Botanisches Museum at Berlin, where it was fortunately photographed by Macbride as his type photograph no. 17459, but is now destroyed. Hayek (1908) says: "Ein kleines Spalierstrauchlein, in Blütengrösse, und Blattgestalt mit vorige [V. parvula Hayek] ziemlich übereinstimmend, aber durch die Wuchsform, das dichtere Indument und die dichten Ähren leicht zu unterschieden."

The species has been found on dry cliffs, at 3700 meters altitude, flowering in March. Material has been misidentified and distributed in herbaria as V. microphylla H.B.K.

In all, 2 herbarium specimens and 2 mounted phototypes have been examined by me.

Citations: PERU: Puno: Weberbauer 440 [Macbride photos 17459] (Kr--photo of type, N--photo of type). BOLIVIA: La Paz: Buchtien 1102 (N, S).

xVERBENA WINGEI Moldenke, Bot. Gaz. 106: 164. 1944.

Synonymy: Verbena tenera x aubletia Winge, Proc. Linn. Soc. Lond. 150: 236. 1938. Verbena aubletia Jacq. x V. tenera Spreng. ex Moldenke, Résumé 358, in syn. 1959. Verbena canadensis (L.) Britton x V. tenuisecta Briq. ex Moldenke, Résumé 360, in syn. 1959. Verbena tenuisecta Briq. x V. canadensis (L.) Britton ex Moldenke, Résumé 376, in syn. 1959.

Bibliography: Winge, Proc. Linn. Soc. Lond. 150: 235. 1938; S. A. Cain, Found. Pl. Geogr. 335. 1944; Moldenke, Bot. Gaz. 106: 164. 1944; Moldenke, Alph. List Invalid Names Suppl. 1: 27. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 165 & 200. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 263. 1953; Moldenke, Am. Midl.

Nat. 59: 363. 1958; Moldenke, Résumé 225, 358, 360, 376, & 474. 1959; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2213. 1961; Moldenke, Phytologia 8: 121 (1961), 8: 435, 437, & 440 (1962), and 11: 271 & 290. 1965.

This is the hybrid between V. canadensis (L.) Britton and V. tenuisecta Briq., produced artificially by Winge in England in 1938. Its characters are intermediate between those of the two parental species. Cain (1944) points out that Winge was able to segregate both parental species from the offspring of this hybrid because the series of characters separating them are apparently linked in the chromosomes. The two parental species are often grown together in gardens and are found wild together in at least 2 parishes of Louisiana, 12 counties of Texas, and one county each in Alabama and Florida. Verbena tenuisecta is spreading rapidly in the southern United States; already it is wild in 5 counties of Alabama, 4 of Mississippi, 16 of Florida, 28 of Georgia, and 16 of Texas. Verbena canadensis is native in all of these states, so the hybrid is to be expected throughout the area.

VERBENA WRIGHTII A. Gray, Syn. Fl. N. Am. 2 (1): 337—338. 1878.

Synonymy: Verbena pinnatifida M. E. Jones ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941 [not V. pinnatifida Lam., 1791, nor Nutt., 1941, nor Schau., 1895]. Verbena aubletia var. bipinnatifida Fendler ex Moldenke, Résumé Suppl. 3: 36, in syn. 1962. Verbena bipinnatifida var. latifolia Perry ex Moldenke, Résumé Suppl. 3: 36, in syn. 1962 [not V. bipinnatifida var. latifolia Scholl, 1960].

Bibliography: A. Gray, Syn. Fl. N. Am. 2 (1): 337. 1878; S. Wats., Proc. Am. Acad. Sci. 18: 136. 1883; Coult., Contrib. U. S. Nat. Herb. 2: 328. 1892; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 148. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1180. 1895; Eggert, Torreya 2: 123. 1902; Shreve, Carnegie Inst. Wash. Publ. 217: 44. 1915; Perry, Ann. Mo. Bot. Gard. 20: 248, 312, 327—329, 331, & 356, pl. 13. 1933; Junell, Symb. Bot. Upsal. 4: 11 & 14. 1934; Cory, Texas Agr. Exp. Sta. Bull. 550: 89. 1937; Moldenke, Cult. Pl. 35. 1938; O. E. Sperry, Sul Ross State Teach. Coll. Bull. 19: 68. 1938; Moldenke, Annot. & Classif. List 109. 1939; Moldenke, Prelim. List Invalid Names 47. 1940; Wyman & Harris, Navajo Ind. Ethno-Bot. 45 & 47. 1941; Moldenke, Suppl. List Invalid Names 10. 1941; O. E. Sperry, Sul Ross State Teach. Coll. Bull. 22: 41. 1941; Worsdell, Ind. Lond. Suppl. 2: 487. 1941; Moldenke, Alph. List Invalid Names 49. 1942; Moldenke in Lundell, Fl. Texas 3 (1): 19 & 42—43. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 11—15, 19, 74, & 102. 1942; Little & Campbell, Am. Midl. Nat. 30: 664. 1943; Moldenke, Castanea 10: 39. 1945; Moldenke, Alph. List Cit. 1: 31, 108, 114, 125—127, 175, 191, 202, 203, 226, 242, 246, 262, 270, 279, 280, & 295—297. 1946; Moldenke, Phytologia 2: 327, 329, & 331 (1947) and 2: 478. 1948; Moldenke, Wrightia 1: 233. 1948; H. N. & A. L. Moldenke, Pl. Life 2: 90. 1948; Moldenke, Alph. List Cit. 2: 392, 400, 407, 439, 450, 467,

470—475, 477, 480, 483, 489, 491, 492, 494, 497, 505, 506, 521—524, 527, 528, 538, 539, 549, 594, 595, 597, 598, 617, & 639—641 (1948), 3: 667, 673, 677—679, 682, 684, 701, 722, 723, 729, 731, 748, 752, 754, 768, 769, 779, 784, 789, 795—797, 824, 839, 848, 858, 873, 883, 914, 932, 950, 952, 954, 963, 965, 970, & 973 (1949), and 4: 990—992, 996, 997, 1004, 1086, 1093, 1107—1109, 1111, 1115, 1138, 1139, 1141, 1142, 1148, 1150, 1151, 1154, 1155, 1166, 1167, 1174, 1203, 1213, 1223, 1225, 1226, 1229—1231, 1240, 1243, 1244, 1252, 1255, & 1289—1291. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 17, 20, 21, 24—26, 33, 165, & 200. 1949; Moldenke, Am. Wild Fls. 292 & 450. 1949; Moldenke, Phytologia 3: 73 & 132 (1949) and 3: 458. 1951; McDougall & Sperry, Pl. Big Bend Nat. Park 146 & 148, fig. 146. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2213. 1951; Moldenke, Inform. Mold. Set 48 Spec. [4]. 1954; Klots, Desert Life 7, 8, & 61, fig. 8. 1954; Moldenke, Résumé 21, 25, 26, 30—32, 40, 149, 225, 372, & 474. 1959; Irwin, Roadside Flow. Tex. 189. 1961; Lewis & Oliver, Am. Journ. Bot. 48: 639—641, fig. 5. 1961; Moldenke, Phytologia 8: 123 & 149—152 (1961) and 8: 177, 182, 207, 213, 215, 243, 279, 397, & 436. 1962; Moldenke, Résumé Suppl. 3: 36 & 41 (1962), 5: 4 (1962), and 6: 3. 1963; Moldenke, Phytologia 9: 15—17, 24, 27, 84, 87, 131, 133—136, 144, 215, & 220 (1963), 10: 92, 94, 98, 102, & 107 (1964), and 11: 32, 47, & 48. 1964; Moldenke, Résumé Suppl. 8: 1. 1964; Moldenke in Shreve & Wiggins, Veg. & Fl. Son. Des. 2: 1245. 1964; Moldenke, Phytologia 11: 257 & 308. 1965.

Illustrations: Perry, Ann. Mo. Bot. Gard. 20: pl. 13. 1933; McDougall & Sperry, Pl. Big Bend Nat. Park 148, fig. 146. 1951; Klots, Desert Life fig. 8. 1954; Lewis & Oliver, Am. Journ. Bot. 48: 640, fig. 5. 1961.

Erect annual herb, to 60 cm. tall, often globose or in clumps, branched from the base, often spreading, with a short taproot; stems usually several from a common base, decumbent-ascending to erect, branched, sparsely hispid-hirsute; leaves subsessile or contracted into a short margined petiole, decussate-opposite; leaf-blades 2—4 cm. long, bipinnatifid or trifid, with the divisions more or less deeply incised, the ultimate segments narrowly lanceolate, hirtellous or hirsute on both surfaces; spikes short-pedunculate, more or less compact in fruit; bractlets lanceolate, shorter than the calyx, acute or acuminate at the apex, hirsute-ciliate; flowers fragrant, showy when in bloom; corolla hypocrateriform, varying from pink, rose-pink, lilac-pink, deep-pink, attractive bright-pink, bright purplish-pink, pinkish-lavender, deep pink-lavender, pinkish, or reddish to lavender, rose-lavender, rose, rose-purple, purplish, purple, light-purple, cerise, mauve, magenta, or even blue, its tube 11—12 mm. long, pubescent around the throat, the limb 6—8 mm. wide, the lobes retuse at the apex; fruiting-calyx 7—9 mm. long, densely glandular, somewhat viscid-pubescent, hirsute on the veins, its teeth short, unequal, subulate, usually less than 2 mm. long; cocci 2.5—3 mm. long, reticulate-scrobiculate above, striate toward the base, the commissural faces muricately scabrous; chromosome number: n = 10, 2n = 20.

The type of this species was collected by Charles Wright (no. 1504, in part) -- in whose honor it is named -- near Frontera, on the borders of Texas and adjacent New Mexico and Chihuahua, and is deposited in the Gray Herbarium at Harvard University. Jackson (1895) ascribes the species, from its original publication, to "Mexico". Parry, Bigelow, Wright, & Schott s.n. in the Britton Herbarium is probably a topotype, collected on March 22, 1852. The specific epithet is often uppercased.

The type of V. pinnatifida M. E. Jones was collected by Marcus Eugene Jones in Bernalillo County, New Mexico, and is deposited in the herbarium of Pomona College; that of V. aubletia var. bipinnatifida was gathered by August Fendler (no. 586) in waste fields and low valleys in the mountains of Santa Fe County, New Mexico, and is deposited in the herbarium of Dartmouth College at Hanover, New Hampshire; and that of V. bipinnatifida var. latifolia Perry was collected by R. M. Scholl (no. 11) in Culberson County, Texas, and is deposited in the herbarium of the University of Texas at Austin (but the same trinomial accredited to Scholl himself, based on his no. 8, is V. ambrosifolia Rydb.). The V. pinnatifida of Lamarck is a synonym of V. hastata L., while those of Nuttall and of Schauer are V. bipinnatifida Nutt.

E. D. Schulz 4057 has a notation on its label to the effect that the "flowers [are] much deeper in color than those of V. bipinnatifida." For the benefit of those interested in the color variations of this species [or, what may be the more likely situation, the color-concepts and color-definitions of its collectors!], I give herewith the corolla color as recorded on various of the cited collections: "lavender" - Lundell & Lundell 10222, Nelson & Nelson 4983; "rose-lavender" - Archer 3427; "pinkish-lavender" - Lundell & Lundell 10177 & 10244; "deep pink-lavender" - E. R. Schulz s.n. [near Alpine, Aug. 4, 1928]; "pink" - Lundell & Lundell 10255, McVaugh 12300; "pinkish" - Nelson & Nelson 5017; "deep-pink" - Correll & Rollins 23676, Lundell & Lundell 16941; "rose-pink" - Lundell & Lundell 13127, 13185, & 14339; "bright purplish-pink" - McVaugh 7868; "attractive bright-pink (not purplish)" - McVaugh 7508; "lilac-pink" - H. N. Moldenke 10080; "rose" - Ferris & Duncan 2647, C. H. Mueller 8215; "rose-purple" - E. D. Schulz s.n. [8/31/1931], P. C. Standley 40625; "reddish" - R. L. McGregor 16712; "purplish" - Lundell & Lundell 10247; "purple" -- Whitehouse 19537; "light-purple" - D. W. Lee 3; "cerise" - Correll & Johnston 18402; and "blue" - Stanford, Retherford, & Northcraft 241.

Little & Campbell (1943) regard V. ambrosifolia Rydb. as a synonym of V. wrightii, but, although they are admittedly very closely related, I feel that both are worthy of being upheld. Specimens with intermediate characters may prove to be hybrids.

Verbena wrightii has been found growing on plains and outwash

plains, hills and dry hills, as well as on banks in lava-covered hills, hillsides, dry or rocky hillsides, dry or grassy slopes, unwooded or rocky mountain slopes, the dry slopes of canyons, on mountainsides and semi-desert mountainsides, banks and flats, dryish gravelly banks and dry flats, on rocks and ridges, gravel bars, on sandy plains and rolling grasslands, on rocky canyon walls, and the banks of mountain streams. Collectors have encountered it in cleared or cultivated ground, in dry ground along railroads, in loose or rocky soil, in sandy or in sandy-rocky soil, in moist loam, and in rich loam soil, along roadsides and sandy roadsides, disturbed roadsides, arroyos, creeks, and moist streamsides, and among large granite boulders. It inhabits canyons and canyon beds, mountains and dry valleys, dry gravelly creekbeds and dry draws, arid aeolian deposits, deserts and desert washes, rolling or desert grasslands, foothills and valleys, sandy draws in the hills, burrow pits and desert areas, in the juniper belt, in washes at the base of buttes, and in gravel and sand beds on rocky slopes, at altitudes of 2100 to 7800 feet, flowering and fruiting from February to November.

In Colorado it was found by Loughbridge "in dry light adobe clay soil on gentle southwesterly slope, heavily overgrazed area, associated with Juniperus monosperma, Pinus edulis association, with Artemisia spp., Eurotia, Bouteloua, etc., density 30 percent", while Baker, Earle, & Tracy call it "a common weed in places" there. In Oklahoma it was found by Hopkins & Valkenburgh "on top of mesa in black volcanic rock and soil derived from it in dry xeric plateau."

In Texas it is said to be found generally in fields, flats, and dry gravelly creekbeds and bars and on dry or semi-desert hillsides and slopes, blooming from February to November, in the western and central sections of the state from El Paso and Presidio to Bexar and Guadalupe Counties. In Jeff Davis County it is described by Hinkley as "frequent", by McVaugh as "common....[in] rocky soil along roadside", by the Moores as "very common" in limestone gravel soil on highway embankments, while Tharp says "along spring in lavas, semi-abundant near spring, the only place found". Hanson calls it "frequent on rocky hillsides" in Presidio County, while York found it there "in creosote-blackbrush association". Janszen observed it growing "in buff silt, alluvial cover, hilly topography" in Culberson County. Waterfall found it in "calcareous soil along depression and ditch through Larrea-Prosopis association" in Reeves, "in Yucca-Agave association" in El Paso, and "in gypseous soil on level plain in Prosopis-Gutierrezia association" in Culberson County. M. S. Young calls it "common in open valley"; Cory says "infrequent on highway shoulders" in Reeves, and Warnock calls it "scattered" or "infrequent in igneous soil" in Brewster County. The last-named collector also found it to be "infrequent in limestone hills" and "frequent along highway in low limestone hills" in Hudspeth, "frequent on limestone flats" and "frequent on rocky igneous soil" in Brewster, "infrequent in rocky igeneous soil" in Jeff Davis, "infre-

quent on limestone slopes" in El Paso, "frequent along highway in red sandy soil" and "abundant" in Presidio, "frequent" in Reeves, and "frequent in limestone soil along highways" in Pecos Counties.

In New Mexico, according to Fendler, it inhabits "waste fields and low valleys in the mountains", while Waterfall found it in "desert grasslands with some Nolina" and "on stony hillsides, with Nolina and Acacia"; P. C. Standley says that it is "common" in Slaughter Canyon in the Guadalupe Mountains. Benson reports it from the Upper Sonoran Zone in Arizona, while Wagenknecht says that it is "common in sandy soil along edge of roadsides".

In Nuevo León the species inhabits "rock and gravel in xerophytic canyons", according to Painter, Lucas, & Barkley, while in Coahuila it is said by McVaugh to be "abundant in open sandy slopes of mountain valley sparsely wooded with oak and pinyon" and McGregor reports it as "scattered in dry rocky open range", while Stanford, Retherford, & Northcraft found it "in playa valleys with considerable drainage from surrounding hills, with Larrea, Acacia, and herbaceous weeds common." It was introduced into cultivation in or about 1937.

In Shreve & Wiggins (1964) it is stated that V. wrightii grows "In moist rich loam among boulders, loose sandy or rocky soil, or even dry, light adobe clay or calcareous soil, Lower Sonoran to lower parts of Arid Transition Zones (to 7,000 feet), western Arizona near Wickenburg to Colorado, Oklahoma, and Texas and south to San Luis Potosí."

G. J. Harrison 1960 has the pubescence of the calyx and bractlets very short -- it bears a notation by T. H. Kearney, dated October 16, 1934, reading "gland about as large as the anther cells and equalling or somewhat surpassing them." The Wooton 642, distributed as "V. bipinnatifida x wrightii", seems to be V. ambrosifolia Rydb. Eggert (1902) states that V. wrightii hybridizes with V. racemosa Eggert, but I have not as yet seen any specimens of such a hybrid, nor does he cite any.

Verbena wrightii is called "desert verbena" and "Wright's verbena". Wyman & Harris (1941) report that the Navajo Amerinds make an irritant medicine from this plant, called "'ze.?ńčį.? i."

Material of this species has been misidentified and distributed in herbaria under the names V. ambrosiaefolia Rydb., V. ambrosiafolia Rydb., V. ambrosiifolia Rydb., V. aubletia L., "V. aubletia (intermediate)", V. bipinnatifida Nutt., V. bipinnatifida x wrightii Wooton, V. canadensis Britton, V. ciliata Benth., V. ciliata var. longidentata Perry, V. ciliata var. pubera (Greene) Perry, V. gooddingii Briq., V. goodingii Briq., V. neomexicana (A. Gray) Small, V. pinnatifida Lam., V. pubera Greene, V. pumila Rydb., V. supina L., V. teucriifolia Mart. & Gal., and even Labiatae.

On the other hand, the Archer 7349, Arsène 21865, Hitchcock & Stanford 6782, O. B. Metcalfe 126, C. H. Muller s.n. [Cat-tail Can-

yon, 7-6-32], A. Nelson 10548, Rozynski 312, P. C. Standley 40334, W. Stewart s.n. [Mimbre Mts., June 26, 1936], L. F. Ward s.n. [two miles south of Holbrook, June 17, 1901] & s.n. [Woodruff, June 20, 1901], B. H. Warnock W.283, Wooton & Standley 3635, Wynd & Mueller 572, and M. S. Young s.n. [Davis Mts., 9/18/18], distributed as V. wrightii, are actually V. ambrosifolia Rydb.; the Edw. Palmer 1050, distributed as "V. wrightii Gray var.?", is also V. ambrosifolia; Holzinger s.n. [Santa Rita, Aug. 1, 1911] and R. R. Humphrey s.n. [9/2/34] are V. ambrosifolia f. eglandulosa Perry; Earle & Earle 526, Goodman & Hitchcock 1211, Kearney & Peebles 14234, MacDougal 317, Shreve 4367, Townsend & Barber 139, Mrs. C. D. Walcott s.n. [Grand Canyon, Aug. 1938], and Warnock & McBryde 14866 are V. bipinnatifida Nutt.; Griffiths 4833 is V. bipinnatifida var. latilobata Perry; L. D. Benson 9467, M. E. Jones 23244 & 26231, B. Maguire 10542, E. W. Nelson 3920, and Shreve 7926 & 8279 are V. ciliata Benth.; Wooton s.n. [Post, May 22, 1925] is V. ciliata var. longidentata Perry; Gould & Pultz 3154, Maguire, Richards, & Moeller 11503, L. F. Ward s.n. [near Black Tank, June 1, 1901], and Wooton s.n. [mesa near N. H. Ranch, July 13, 1906] are V. ciliata var. pubera (Greene) Perry; Barneby 2806, Eggleston 10813, and E. G. Marsh 1225 & 1258 are V. elegans H.B.K.; E. W. Nelson 3896 and Edw. Palmer 1052 are V. elegans var. asperata Perry; Borell s.n. [Bonita Canyon, Sept. 8, 1935], Cutler 2002, D. R. Goddard 525 & 825, Goodding 76-52, Griffiths 4435, C. F. Harbison 41178, W. W. Jones s.n. [Dragoon, Aug. 18, 1920], Kearney & Peebles 9720, 11118, & 12669, Peebles 6732, Wooton s.n. [Kingman, Aug. 13, 1911], and Zuck s.n. [Tucson, May 16, 1896] are V. gooddingii Briq.; E. B. Bartram 257, Goodding 952, P. B. Kennedy 7033, J. G. Lemmon s.n. [Huachuca Mts., Aug. 1882], and Mearns 1904 & 1914 are V. gooddingii var. nepetifolia Tidestr.; while B. H. Warnock T.44 & T. 45 are V. wrightii f. albiflora Moldenke.

C. C. Ellis 17 and Wooton 364 are mixtures with V. ambrosifolia; B. H. Warnock T.66 is a mixture with V. ciliata; M. E. Jones 3801 and Tracy & Earle 162 are mixtures with V. ciliata var. pubera; Wencurtin s.n. [5-2-1916] is a mixture with V. pumila Rydb.

A. Nelson 11338 has been identified by me in some herbaria as V. ambrosifolia; Eastwood 8468 in the herbarium of the California Academy of Sciences and J. Skehan 5 also greatly resemble V. ambrosifolia and may be that taxon or else a hybrid.

Tharp 46090 in the Stockholm herbarium in inscribed "Dona Ana Co., Texas" in error. The P. C. Standley 40625, cited below from Otero County, New Mexico, may have been collected in Chaves or in Eddy Counties -- its label is inscribed "Slaughter Canyon in Guadalupe Mts."; the J. J. Thornber s.n. [6/21--23/05] could be from Pima

or Pinal Counties, Arizona -- the label in inscribed "Reddington--Mammoth"; Eastwood 15697 may be from Bernalillo or McKinley Counties -- the label is inscribed "between Albuquerque and Gallup"; Worth & Priest 540b may have come from Lincoln or Socorro County, New Mexico — the label reads "between Carrizoso and Socorro"; Tharp 3691, collected in Paisano Pass, could be from either Brewster or Presidio County since this pass leads from one to the other. Cottam 10244 is labeled "Old Fort Butterfield, Texas", and was probably collected somewhere along the route of the Butterfield Overland Mail (1858—1861) which followed a route from Grayson through Cooke, Jack, Nolan, Upton, and Pecos Counties to El Paso. Dr. Geiser thinks that the locality refers to the pineries at the corner of Hudspeth and Culberson Counties, where Cottam is known to have collected Verbena specimens.

The Coult., Contrib. U. S. Nat. Herb. 2: 328 reference in the bibliography of this species is often cited as "1894", but apparently should be 1892.

Perry (1933) cites the following 43 additional specimens not as yet seen by me: COLORADO: La Plata Co.: Baker, Earle, & Tracy 531 (E, G). TEXAS: Brewster Co.: Moore & Steyermark 3324 (E). Culberson Co.: Eggert s.n. [flats near Van Horn, 13 May 1901] (E, G); Young s.n. [Guadalupe Mountains, 9 Sept. 1916] (E). Hudspeth Co.: Havard 97 (G); Thurber 143 (G). Jeff Davis Co.: Ferris & Duncan 2647 (E); E. J. Palmer 30672 (E); Tracy & Earle 162, in part (E, F, G, W). Presidio Co.: H. C. Hanson 551 (E). Terrell Co.: E. J. Palmer 33583 (E). Ward Co.: Tracy & Earle 61 (E, F, G). County undetermined: C. Wright 1504, in part [Fronteras] (G—type), s.n. [mountains near Fronteras, 22 March 1852] (E). NEW MEXICO: Bernalillo Co.: C. C. Ellis 17, in part (E); Kammerer 33 (E). Dona Ana Co.: P. C. Standley s.n. [Organ Mountains, 11 June 1906] (E). Grant Co.: Eastwood 8468 (G); Eggleston 17231 (E); E. L. Greene s. n. [near Silver City, 1880] (E); O. B. Metcalfe 126, in part (E, G); Pilsbry s.n. [Gallina's Canyon, Black Range, 17 Aug. 1915] (D). Lincoln Co.: Wooton 364, in part (E, G). Otero Co.: O. B. Metcalfe 1090, in part (E, G); Rehn & Viereck s.n. [Alamogordo, 7 April—24 May 1902] (D, E); Viereck s.n. [High Rolls and vicinity, 21—28 May 1902] (D). San Miguel Co.: Mulford 37 (E). Santa Fe Co.: Heller & Heller 3536 (E, G). County undetermined: Wislizenus 483 [Rabbit Ear Creek] (E); C. Wright 1503, in part [1851—52] (E). ARIZONA: Apache Co.: Marsh 11224 (E). The Bigelow s.n. which she cites from "NY" is actually in the Columbia University Herbarium; her "Heller 3536" is the same collection cited below as Heller & Heller 3536, and the Wright s.n. which she cites as from Fronteras and deposited at "NY" is the Parry, Bigelow, Wright, & Schott s.n. cited below. The Clawson 13923 which she cites is regarded by me as representing V. ambrosifolia. Her Ellis 17, Wooton 364, and Met-

calfe 126 & 1090 appear to be mixtures with V. ambrosifolia. The H. S. Barber 106, Griffiths 4757, W. Hough 109, Peebles 5353, Toumey 304 1/2, and Zuck s.n. [Snowflake, July 30, 1897], cited both by Perry and by me as V. ciliata Benth., were all annotated by T. H. Kearney in the United States National Herbarium as "Verbena Wrightii ?"

Perry (1933) says of V. wrightii "On account of its strong variability, this species has been exceedingly difficult to define. It was first set apart as an erect annual, with anther-glands as high and almost as large as the anther-cells. In the series of specimens at hand, the anther-glands are neither constant in size nor in height relative to the anther-sacs. The main characters appear to be the glandular somewhat viscid pubescence of the calyx, the very short acute-subulate calyx-teeth, and the somewhat compact spikes."

In all, 454 herbarium specimens, including type material of most of the names involved, have been examined by me.

Citations: KANSAS: Finney Co.: W. R. Dudley s.n. [near Garden City, June 10, 1896] (Du--24171). COLORADO: Boulder Co.: A. G. Vestal 373 (Du--140526). El Paso Co.: R. B. Livingston 3131 (H--63112). Fremont Co.: Degener & Degener 27016 (N, Z). La Plata Co.: Baker, Earle, & Tracy 531 (Cm, Du--151797, Mi, N, Po--63889, W--337397); Eastwood 5368 (Gg--31289); Ferril s.n. [May 11, 1906] (Bl--42301); Loughridge 461 (Bt--24702); R. W. Pohl 2002 (Up); Ramaley 16163 (Bl--43765); Way s.n. [Oxford, 1916] (Bl--42358). Las Animas Co.: Herb. State Agric. Coll. 4184 (N). County undetermined: H. L. Zobel s.n. [Deer Creek Canyon, May 25, 1934] (Bt). OKLAHOMA: Cimarron Co.: G. J. Goodman 2412 (Io--143360, N); Goodman & Waterfall 4811 (St); Hopkins & Van Valkenburgh 5809 (N); G. W. Stevens 484 (Du--65886). Harper Co.: G. J. Goodman 2398 (Io--143358). TEXAS: Bexar Co.: Havard s.n. [San Antonio] (W--221164). Brewster Co.: Collector undesignated L.1-3 (Sr); Ferris & Duncan 2876 (Du--124241), 3000 (Du--124409); G. L. Fisher s.n. [Alpine, Aug. 23, 1932] (Wi); Herb. Univ. Texas s.n. [Marathon, 6/4/31] (Au, Au, Au); Lewis & Oliver 5451 (Nb), 5454 (Nb); C. L. Lundell 13185 (N, Rf); Lundell & Lundell 10244 (Ld, N, W--1888908); W. B. Mc Dougall s.n. [10/5/35] (Mv); R. McVaugh 7868 (Ar--233632, Ar--178200, Mi); A. R. Moldenke 168 (Fg); Moore & Steyermark 3324 (Ca--471228, Du--224478, Gg--194780, Mi, N, W--1566749); C. H. Mueller 8140 (Au, Mi, N, N); L. T. Murray s.n. [Chisos Mts., July 24, 1938] (Ar--219761); Nelson & Nelson 5025 (Ka); Parks & Cory 6471 (Tr), 7337 (Tr), 9148 (Tr); Rose-Innes & Warnock 586 (Au); E. D. Schulz s.n. [near Alpine, Aug. 4, 1928] (Wi), s.n. [8/4/1928] (Wi); O. E. Sperry 75 (W--1684175), 1737 (Om), T.126 (Om), T.130 (Om, W--1679253), T.573 (Fs, Om), T.1073 (Ca--882852), T.1142 (Ca--882851);

Steiger 1053 (N), 1133 (N); Tharp 8840 (Au, Au), s.n. [Chisos Mts., 5-10-37] (Mi); B. H. Warnock 66 (W--1730933), 75 (N), 4000/7051 (Au--122863), 4700/5562 (Au--122862), 9953 (Rf), 20022 (Au, Ok, S), C.802 (N), T.66, in part (Au), W.167 (N), W.283 (Au, N); M. S. Young s.n. [8/12/15] (Au), s.n. [9/12/15] (Au). Crane Co.: Lundell & Lundell 10222 (Ld, N). Culberson Co.: Hitchcock & Stanford 6782 (Pl--116714, Rs--30824, Se--69417); Janszen 420 (Au--121659); Lehman s.n. [June 28, 1939] (Tr); Scholl 11 (Au--121658); O. E. Sperry T.129 (W--1679252); Waterfall 3775 (Tu--116233). El Paso Co.: B. Barlow s.n. [Canutillo, 12 July 1911] (Ca--882860, La, W--1430157); Benedict 16 (W--1568212); M. K. Clemens s.n. [El Paso, Oct. 24, 1916] (Po--173749); Knobloch 1692 (Mi); Lundell & Lundell 16941 (Rf); R. L. Oliver 95 (Nb); Shinners 8994 (Sm); B. H. Warnock 4650/7358 (Au--122853), 7358 (Rf), 10411 (Rf); Waterfall 3922 (St, Tu--128443). Guadalupe Co.: Earle & Earle 430 (N); M. S. Young s.n. [9/9/16] (Au). Hudspeth Co.: Havard 97 (W--147594); C. H. Mueller 8215 (Sm); Thurber 143 (C); B. H. Warnock 4100/5912 (Au--122852), 13813 (Au--171956, Rf). Jeff Davis Co.: Bequaert s.n. [May 1, 1961] (Au--208171); Correll & Johnston 18402 (Rf); Cory 17569 (Md), 27903 (N), 53075 (Sm), s.n. [Sunny Glen Canyon, 8-29-27] (Tr); Earle & Tracy 162, in part (N); Ferris & Duncan 2647 (Ba, Du--126171, Gg--31429, N, Po--127357); E. Hamby 1112 (Ar--206808); Herb. Univ. Texas 71 (Po--161328); L. C. Hinckley 114 (N), s.n. [Mt. Livermore, 10-13-34] (Au, Au), s.n. [H. O. Canyon, July 27, 1937] (N), s.n. [8/2/37] (Fs); Lundell & Lundell 10255 (Ld, N), 13127 (Rf, Sm); R. McVaugh 7508 (Mi, Rf, Sm); A. R. Moldenke 647 (S); Moore & Moore 2 (Ca--755008, N, S); E. J. Palmer 32195 (Au); Parks & Cory 9599 (Tr), 9635 (Tr), 17568 (Tr), 17653 (Tr), 18893 (Tr); H. R. Reed 101 (Ar--307333, N); E. D. Schulz 4057 (Wi); Tharp 51-22 (Au--121583); Tharp & Janszen 49-1140 (Au--121573, Lw); Tracy & Earle 162, in part (Au), 162a (N); B. H. Warnock 5900/5684 (Au--122854), 13547 (Au--198386, Rf), 21676 (N); S. E. Wolff 1666 (W--1623954); M. S. Young s.n. [Davis Mts., 9/18/18] (Ur). Montgomery Co.: Brenckle & Brenckle 51103 (Le). Pecos Co.: G. L. Fisher 36105 (W--1679361), s.n. [July 20, 1936] (Se--69271); Goodman & Waterfall 4565 (Ok); Lundell & Lundell 10177 (Ld, N, W--1887631); B. H. Warnock 13956 (Rf), C.802 (Au, N); Whitehouse 19537 (Mi, N); S. E. Wolff 4390 (Tr). Presidio Co.: Correll & Rollins 23676 (Ld); Cory 31173 (N); Drushel 11102 (N); H. C. Hanson 551 (N, W--982893); L. C. Hinckley 1934 (N), s.n. [July 9, 1941] (Au); D. C. Ingram 2388 [Herb. Forest Serv. U. S. D. A. 96393] (S), 2467 [Herb. Forest Serv. U. S. D. A. 96394] (Au--186858, W--2344745), 2533 [Herb. Forest Serv. U. S. D. A. 96395] (Au--186864); J. Knight s.n. [Marfa, 9-29-32] (Au);

Lundell & Lundell 10247 (N), 14339 (N, Rf); Tharp 3691 (Au); B. H. Warnock 4300/5601 (Au--122851), 14594 (Rf); C. L. York 48064 (Au--122008). Reeves Co.: Cory 52259 (N); Nelson & Nelson 4983 (Au, Ka), 5014 (Au, Ca--710303), 5017 (W--1974035); Parks & Cory 18358 (Tr); B. H. Warnock 9945 (Rf); Waterfall 4386 (N, Tu--31203). Val Verde Co.: E. D. Schulz s.n. [8/31/1931] (Wi). Ward Co.: Tracy & Earle 61 (Au, Cm, Es, N, N, Vt, W--441790). County undetermined: Cottam 10244 [Old Fort Butterfield] (Fs); Parry, Bigelow, Wright, & Schott s.n. [Frontera, Mar. 22, 1852] (N--topotype). NEW MEXICO: Bernalillo Co.: C. C. Ellis 17, in part (W--890528); M. E. Jones 457 (Po--83728), s.n. [Albuquerque, Sept. 5, 1884] (Gg--154421, N, Tu), s.n. (Po--65185); Kammerer 33 (N); D. F. Morgan s.n. [summer, 1939] (Ok); Mulford s.n. [near Albuquerque, Sept. '95] (Ur); H. H. Rusby s.n. [Albuquerque, Sept. 5, 1909] (N). Catron Co.: O. B. Metcalfe s.n. [Mangas Spgs., Aug. 1901] (W--562286); A. R. Moldenke 155 (Fg). Chaves Co.: G. J. Ikenberry 389 (St); Steiger 290 (N); Waterfall 10566 (St). Dona Ana Co.: Archer 3427 (H--68552); Ellison 783 (La), s.n. [Organ Mts., Sept. 1, 1929] (La); M. E. Jones s.n. [Rincon, 5-16-1890] (Po--71163); Munz 13263 (Ca--537032, Po--204037, Ua--25323, Va--14830); P. C. Standley s.n. [Mesilla Valley, May 21, 1906] (W--560978), s.n. [Van Pattens, June 11, 1906] (W--560979); Tharp 46090 (Au, N, S); Wooton 174 (Du--91155), 1900 (Au), s.n. [Organ Mts., May 15, 1892] (Ca--112317), s.n. [Organ Mts., Apr. 30, 1893] (Hp, W--241163), s.n. [Sept. 15, 1893] (We), s.n. [Organ Mts., Aug. 29, 1894] (C, N), s.n. [Van Pattens, Aug. 29, 1894] (W--736872), s.n. [Organ Mts., May 8, 1895] (Po--70880), s.n. [Apr. 15, 1899] (Bl--42342), s.n. [June 7, 1900] (Du--91154), s.n. [Organ Mts., 1900] (N, W--560635), s.n. [May 26, 1904] (Fs), s.n. [Filmore Canyon, May 25, 1905] (W--736871), s.n. [June 10, 1906] (Ob--50878). Eddy Co.: V. Bailey s.n. [Carlsbad Cave, Apr. 15, 1924] (W--1220144); D. W. Lee 3 (W--1203610); A. Nelson 11401 (Ca--500719, S); Waterfall 3720 (Tu--115260), 10614 (St); Wilkins 1736 (En). Grant Co.: Bigelow s.n. [Copper Mines, July 28th 1851] (C); Blumer 44 (W--563467); Eastwood 8468 (Gg--31427, W--1102096); Eggleston 17231 (N); Emery s.n. [Oct. 17th 1846] (C); G. L. Fisher 36132 (W--1679375); E. L. Greene s.n. [near Silver City, June 1880] (Po--71129), s.n. [26 July 1880] (Vt), s.n. [Aug. 3, 1880] (Pa); Holzinger s.n. [Fierro, July 29, 1911] (W--660556); Layton s.n. [Santa Rita, Sept. 1931] (Io--138119); Mearns 108 (Du--24198); O. B. Metcalfe 126, in part (Po--70888); Mulford 681 (N); W. Stewart s.n. [Mimbre Mts., June 26, '36] (La); C. B. Wolf 2598 (Ba, Rs--9997). Guadalupe Co.: F. C. Gates 20979 (Ka--922651); Harwood s.n. [Vaugn, 9-10-1921] (Po--18602); A. R. Moldenke 126 (Fg);

A. Nelson 11338 (Du—218830, N, N), 11388 (Ca--500720, S); B. L. Wagenknecht 4754 (Lw). Lincoln Co.: De Busk s.n. [U. S. Dept. Agr. Soil Conserv. Serv. 6005] (Tu--104392), s.n. [U. S. Dept. Agr. Soil Conserv. Serv. 6006] (Tu--104396); Earle & Earle 236 (N, W--382398); L. C. Hinckley 750 (N, N), 776 (N); Hitchcock, Rethke, & Raadshooven 4264a (Ca--603732, Gg--267613); A. Lee 9 (Au, N); F. G. Plummer s.n. [Lincoln National Forest, 1903] (W--563048); J. Skehan 5 (W--350124); Wooton 364, in part (Ca—138816, Du--75577, Ka, Po—71124, Ur); Wooton & Standley 3635 (Du--9536). Luna Co.: Abrams 7259 (Du—98413), s.n. [May 1919] (Du--98125); M. E. Jones 3801, in part (Gg--130524); Mearns 109 (Du--24191, W--56226), s.n. [April 17, 1892] (Du--24195). McKinley Co.: Eastwood 15697 (Gg—161738). Otero Co.: F. S. Earle 539 (N); Goodman & Waterfall 4995 (Ok); G. J. Ikenberry 256 (Ok, St); Layton s.n. [Alamogordo, Sept. 1931] (Io—138743); Orcutt s.n. [Cloudcroft, July 23--26, 1926] (Sd--23256); Rehn & Viereck s.n. [Alamogordo, Apr. 16, 1902] (I, La, Mg--35, Po—148610); E. D. Schulz 549 (Wi); P. C. Standley 40625 (W--1222015); Waterfall 10603a (St); Wooton s.n. [Divide above Mescalero Agency, June 23, 1895] (W--736223), s.n. [Along Tularosa Creek, Aug. 18, 1899] (W--736870), s.n. [White Sands, Aug. 25, 1899] (W--736883). Quay Co.: G. L. Fisher s.n. [Nara Visa, Apr. 21, 1911] (Gg); G. J. Ikenberry s.n. [May 1, 1937] (St). Sandoval Co.: Arsène 20890 (Du--253899); Hedgcock 218 (Se--95967). San Miguel Co.: G. J. Goodman 2308 (Mn--26305, N); G. B. Grant 5758 (Du--75652); Mulford 37 (Io—34047, N, Ur); A. Nelson 11566 (Ca--500723, Du—218832, S); Sturgis s.n. [May 4, 1902] (Ca--216687). Santa Fé Co.: Arsène & Benedict 16555 (I); Fendler 586 (Dt); Heller & Heller 3536 (Du--24168, Ka, N, Ob--50861, Pl—72006, Po—63892, Ur, W--306423); D. F. Morgan s.n. [summer, 1939] (Ok); A. Nelson 11757 (Ca--500722, Du--218831); W. W. Robbins 8242 (Bl--42298); Snow s.n. [Santa Fé, Aug. '80] (H--107719), s.n. [Santa Fé, Aug.] (Ca--67417). Sierra Co.: Cutler 2065 (Ok); O. B. Metcalfe 1090, in part (Gg--31428, N, Po--84188). Socorro Co.: S. B. Benson 323 (Ca—526578); D. B. Dunn 3081 (Lb--48494); C. L. Herrick 704 (W—737263); A. R. Moldenke 636 (S); H. H. Rusby 337, in part (Pr); Wooton s.n. [Devil's Park, Aug. 9, 1900] (W--736934); Worth & Priest 540b (Ba, N). Torrance Co.: F. Clark 460 (St—9203). Union Co.: Wooton s.n. [20 miles west of Patterson, June 21, 1892] (W--562252). Valencia Co.: O. Degener 4853 (Ms); Wooton s.n. [west of Grant's Station, Aug. 2, 1892] (W--562253), s.n. [south of San Rafael, July 29, 1906] (W—736873). County undetermined: De Busk s.n. [Bottomless Lake Hills; U. S. Dept. Agr. Soil Conserv. Serv. 6007] (Tu—104395); Ehlers & Ehlers 6304 [Wilma] (Mh, Mi); Mexican Bound. Surv. s.n. (N); Vasey

s.n. (Ka); Wencurtin s.n. [5-2-1916] (Au). ARIZONA: Apache Co.: L. D. Benson 9555 (Du--326793, Po--267659, Tu--7643); Deaver 1784 (Fg); Griffiths 5190 (W--496584); A. R. Moldenke 153 (B, Fg, S); R. L. Oliver 91 (Nb). Cochise Co.: Cottam 10201 (Fs); J. J. Thornber 4346 (Tu). Coconino Co.: H. H. Rusby 337, in part (Ca--67972). Graham Co.: Eggleston 19912 (W--1524974); Maguire & Maguire 10117 (Ca--676071, N, Pl--130552, Ua--47410), 10179 (Gg--295127, N, N, Ua--47408); Spangehl s.n. [Thatcher, May 1936] (Tu); Thornber & Shreve 7899 (Ok). Greenlee Co.: Maguire, Richards, & Moeller 10095 (N, N, Ua--47409), 11676 (N, N, Ua--47411). Mohave Co.: Kearney & Peebles 12669 (To). Navajo Co.: A. Nelson 10358 (Bt--19646); Peebles 9614 (W--1624359); Peebles & Fulton 9614 (To); L. F. Ward s.n. [Woodruff, June 20, 1901] (N). Pima Co.: Spaulding 37 (Tu). Pinal Co.: G. J. Harrison 1960 (To); J. J. Thornber s.n. [Reddington--Mammoth, 6/21--23/05] (Tu). MEXICO: Coahuila: G. L. Fisher s.n. [Aug. 17, 1930] (I); Gregg s.n. [Saltillo, 6/67] (C); E. G. Marsh 707 (St), 1524 (St); R. L. McGregor 16712 (Lw); R. McVaugh 12300 (Mi); Stanford, Retherford, & Northcraft 241 (Ca--713461, Se--70282); Waterfall 15348 (St), 15782 (St); Waterfall & Wallis 13273 (St); Wynd & Mueller 572 (I). Nuevo León: Painter, Lucas, & Barkley 14281 (Au). San Luis Potosí: C. L. Lundell 5590 (Du--266212). SOUTHERN RHODESIA: Eyles 4349 (Rh). CULTIVATED: New York: T. H. Everett s.n. [H. N. Moldenke 10080] (N); Quinn s.n. [N. Y. Bot. Gard. Cult. Pl. SD.228-37] (N).

VERBENA WRIGHTII f. ALBIFLORA Moldenke, Résumé Suppl. 6: 3, nom. nud. (1963), f. nov.

Haec forma a forma typica speciei corollis albis recedit.

Bibliography: Moldenke, Résumé Suppl. 6: 3. 1963; Moldenke, Phytologia 11: 48. 1964.

This form differs from the typical form of the species in having white corollas.

The type of the form was collected by Barton Holland Warnock (no. T.44) on the campus of Sul Ross College at Alpine, Brewster County, Texas, on April 2, 1936, and is deposited in the Britton Herbarium at the New York Botanical Garden.

The stems are branched at the base, the branches erect or ascending, to 20 cm. or more in length. The plant is described by Cory as "infrequent on graded road 12 1/2 miles northeast of Fort Stockton" in Pecos County. Warnock calls it "infrequent on Jim Nichol's Ranch, Glass Mountains" in Brewster County. The Moores found it on sandy flats at 2200 feet altitude in Reeves County.

Material has been misidentified and distributed in herbaria as V. racemosa Eggert and V. wrightii A. Gray. It has been collected in flower and fruit in March and April.

In all, 8 herbarium specimens, including the type, have been examined by me.

Citations: TEXAS: Brewster Co.: B. H. Warnock T.44 (N--type, W--1730928--isotype), T.45 (N, N, W--1730929). Pecos Co.: Cory 53502 (N). Reeves Co.: Moore & Moore 4 (Ca--755057, N).

VERBENA XUTHA Lehm., Del. Sem. Hort. Hamb. 1834: 7—8. 1834.

Synonymy: Verbena strigosa Hook., Comp. Bot. Mag. 1: 176. 1836 [not V. strigosa Cham., 1832]. Verbena lucaeana Walp., Repert. Bot. Syst. 4: 23. 1845. Verbena matthesii Turcz., Bull. Soc. Nat. Mosc. 36 (2): 196. 1863. Verbena xanthi Gray ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena xutha Schm. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena zutha Lehm. ex Moldenke, Suppl. List Invalid Names 10, in syn. 1941. Verbena xantha Lehm. ex Moldenke, Résumé 378, in syn. 1959. Verbena xanthii Lehm. ex Moldenke, Résumé 378, in syn. 1959. Verbena xertha Lehm. ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963. Verbena xuthia Lehm. ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963. Verbina xutha Lehm. ex Moldenke, Résumé Suppl. 6: 11, in syn. 1963.

Bibliography: Lehm., Del. Sem. Hort. Hamb. 1834: 7--8. 1834; Linnaea 10: Litt.-Ber. 115. 1836; Hook., Comp. Bot. Mag. 1: 176. 1836; Walp., Repert. Bot. Syst. 4: 23. 1845; Steud., Nom. Bot., ed. 2, 2: 751. 1841; Engelm. & Gray, Pl. Lindheim. 1: 21. 1845; Schau. in A. DC., Prodr. 11: 547 & 555. 1847; Turcz., Bull. Soc. Nat. Mosc. 36 (2): 196. 1863; A. Gray, Syn. Fl. N. Am. 2 (1): 335. 1878; S. Wats., Proc. Am. Acad. Sci. 18: 135 & 136.. 1883; Coult., Contrib. U. S. Nat. Herb. 2: 327. 1892; Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 148. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew. 2: 1179 & 1180. 1895; A. W. Chapm., Fl. South. U. S., ed. 3, 369. 1897; J. K. Small, Fl. Southeast. U. S., ed. 1, 1009. 1903; J. W. Blankinship in Engelm. & Gray, Pl. Lindheim. 3: 186. 1907; J. K. Small, Fl. Southeast. U. S., ed. 2, 1009. 1913; Pellett, Am. Honey Pl., ed. 2, 354. 1923; Seymour, Host Ind. Fungi N. Am. 587—588. 1929; J. K. Small, Man. Southeast Fl. 1137. 1933; Perry, Ann. Mo. Bot. Gard. 20: 248, 261, 293--294, 342, 355, & 356. 1933; Cory, Texas Agr. Exp. Sta. Bull. 550: 89. 1937; Moldenke, Prelim. Alph. List Invalid Names 49. 1940; Moldenke, Suppl. List Invalid Names 9 & 10. 1941; Moldenke in Lundell, Fl. Texas 3 (1): 26--27 & 46—47. 1942; Moldenke, Alph. List Invalid Names 48, 50, & 51. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 6, 10, 13, 19, & 102. 1942; Moldenke, Bot. Gaz. 106: 159 & 160. 1945; Moldenke, Castanea 10: 40. 1945; Moldenke, Phytologia 2: 87 & 117 (1945) and 2: 163. 1946; G. L. Fisher, Am. Bot. Exchange List. 1946; Moldenke, Alph. List Cit. 1: 10, 11, 13, 17, 47, 49, 81, 89, 111, 125, 127, 154, 164, 166, 176, 183, 202--204, 207, 209, 221, 249, 253, 254, 278, 280, 283, 288, & 296. 1946; Moldenke, Alph. List Invalid Names Suppl. 1: 25. 1947; Pellett, Am. Honey Pl., ed. 4, 420. 1947; Moldenke, Phytologia 2: 328, 329, & 348. 1947; Moldenke, Wrightia 1: 225 & 226. 1948; Moldenke, Alph. List Cit. 2: 395, 397, 399, 405, 416, 439, 452, 471, 473, 474, 478, 489, 495, 506, 520, 522, 558, 598, 618, 627, & 632 (1948), 3: 657, 665, 671, 678, 679, 683--685, 696, 708, 713, 743, 750, 752, 755, 768—770, 784, 788,

795, 796, 798, 806, 844, 851, 855, 882, 914, 915, 942, 946, & 978 (1949), and 4: 986, 989, 990--993, 1003, 1069, 1107, 1108, 1111, 1113, 1122, 1129, 1132, 1139, 1147--1150, 1162, 1163, 1166, 1170, 1179, 1180, 1183, 1207, 1212, 1213, 1217, 1228, 1230, 1290--1292, & 1298. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 11, 18, 19, 25, 33, 165, & 200. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 14. 1949; Moldenke, Phytologia 3: 72 (1949) and 3: 450, 451, & 468. 1951; Moldenke in Chittenden, Roy. Hort. Soc. Dict. Gard. 6: 2209 & 2213. 1951; Moldenke, Inform. Mold. Set 48 Spec. [4]. 1954; Shinners, Spring Fl. Dallas 326. 1958; Moldenke, Résumé 14, 15, 23, 30, 40, 225, 368, 369, 375, 378, & 474. 1959; Moldenke, Résumé Suppl. 1: 3 (1959) and 2: 3 & 10. 1960; Lewis & Oliver, Am. Journ. Bot. 48: 639--641, fig. 24. 1961; Jones, Rowell, & Johnston, Flow. Pl. & Ferns Tex. Coast. Bend 144. 1961; Moldenke, Phytologia 8: 124 & 435. 1961; Moldenke, Résumé Suppl. 3: 6 & 8 (1962), 4: 4 & 20 (1962), 5: 3 & 4 (1962), 6: 1--3, 9, & 11 (1963), and 7: 2. 1963; Moldenke, Phytologia 8: 471, 472, 477, 478, & 490 (1963), 9: 36, 81, 160, 165, & 215 (1963), 10: 99--101, 104, 108, 110, 140, 178, 182, 186, 211, 217, 218, 304, & 502 (1964), and 11: 13, 110, 111, 127, 128, & 201. 1964; Moldenke, Résumé Suppl. 8: 1 & 3 (1964) and 11: 3. 1964; Moldenke, Phytologia 11: 239 & 338. 1965.

Illustrations: Lewis & Oliver, Am. Journ. Bot. 48: 640, fig. 24. 1961.

Usually a tall, erect, annual or perennial herb, to 2 m. in height, coarse and spindly, sometimes bushy or even procumbent; stems upright or spreading, mostly 3.5--12 dm. tall, erect, tufted in clumps from a common base, tetragonal, branched, hirsute-hispid, rarely procumbent; leaves decussate-opposite, sessile; leaf-blades lanceolate (the upper ones) or oblong to broadly ovate in outline, 5--12 cm. long, the upper ones incised-pinnatifid, the lower ones more often trifid with the segments coarsely dentate or pinnatifid, the lateral segments much smaller than the middle one and close to the sessile base of the blade, strigose above, canescent and spreading-hirsute beneath, the hairs particularly conspicuous along the somewhat paler midrib and secondary veins; spikes lateral and terminal, simple, elongate, often 30 cm. long, 1--3 forming a panicle, somewhat strict, not compact except during anthesis, short-pedunculate, remote-flowered, subcanescent; flowers in subopposite pairs; bractlets lanceolate-subulate, subequaling or commonly a little shorter than the calyx, strigillose, ciliate-margined; calyx 3--4 mm. long, strigose-hirsute, its lobes acuminate-subulate, the green veins ending in mucros; corolla hypocrateriform, varying from blue, lavender-blue, pale lavender-blue, deep-blue, or lilac-blue to gray-lilac, blue-purple, purple, violet, purplish-violet, bluish-violet, blue-lavender, bluish-lavender, lavender, or pinkish-white, hirtellous, its tube approximately as long as the calyx, the throat white, pubescent outside, villous within, the limb medium in size, 5--8 mm. wide; cocci about 2 mm. long, raised-reticulate on the upper half, faintly striate below, the commissural faces reaching the apex of the coccus, muricate or muricately scabrous; chromosome number: n = 21.

The type of V. matthesii was collected by Benno Matthes (no. 13) -- in whose honor it was named -- in Fayette County, Texas. Hooker's V. strigosa was based on two collections of Thomas Drummond -- no. 253 bis from New Orleans, Orleans Parish, Louisiana, in 1832, and s.n. from New Orleans in 1833 -- deposited in the herbarium of the Royal Botanic Gardens at Kew. Verbena lucaeana is merely a new name for V. strigosa, although Tainturier s.n., from New Orleans, is the only specimen cited.

Hooker's description of his V. strigosa is as follows: "Verbena strigosa (n. sp.); strigoso-hirsuta, erecta, stricta, foliis sessilibus rugosis lato-lanceolatis profunde pinnatifidis incisis segmentis valde acutis nervis subtus prominentibus, spicis simplicibus paniculatisve elongatis, floribus laxiusculis. -- N. Orl. (n. 253 bis) and 1833. -- Of this I have received copious specimens, both from Mr. Drummond and from Tainturier, so that it must be a very common plant; yet it does not appear to have been taken up by any author, nor have specimens been transmitted to me through any other source than those now mentioned. Its nearest affinity is, perhaps, with V. stricta, but the leaves are strongly pinnatifid, harsh, with the principal veins more prominent on the under-side, yet not exhibiting such a strongly-reticulated appearance; the spikes are longer, more lax; the flowers much smaller, more distant, and not pressed to the rachis. It is a strong-growing plant, two to three feet high, quite hispid with appressed hairs or bristles."

Walpers (1845) places this species in his Section Verbenaca, Subsection Inermes, Group Foliosae, Subgroup Micranthae, and Secondary Subgroup Schizophyllae with 9 other species. The specific name is often uppercased for no valid reason.

Verbena xutha inhabits sand, red or brown gravelly silty sand, open dry soil, low sandy or sandy loam soil, most streamsides, low roadsides, and the edges of thickets, fields, and roadsides. It has been found in waste ground, open or dry rocky ground, and sandy land, and woody and shady woods, swamps and dry swamps, coastal marshes, waste places, vacant lots, pastures, sandy swales, lowlands, fields and grassy fields, wet pinelands, low meadows, and swales in sandy prairies, along fencerows, roadsides, dry roadsides, and river battures, and on sandy wooded hillsides or open hillsides, beaches, levees, and strand, sandy foothills, gravel sandbars, dry riverbanks, bottoms and beach ridges, prairies, coastal and low coastal prairies, as well as sandy prairies near the coast, growing at altitudes of 1 to 160 meters, flowering from February to November, fruiting from May to November. It is native from Alabama to Arizona.

In Texas it is found in dry mostly sandy soil of beaches, fields, and roadsides and in blackland prairies, in the eastern and southern parts of the state from Bowie and Navarro to Jefferson and Cameron, west to Jeff Davis and Brewster Counties, flowering from March to October. Bush reports it as "common on prairie" in Brazoria County.

The Lundells found it along "roadside through pineland" in Hardin County, Traverse in "Panicum amarulum complex" in Chambers and "in ditch in railroad right-of-way, on sand with some clay, associated with grasses and various herbs" in Harris County; L. D. Smith "between field and wood border of stream" in McLennan, F. W. Gould in "partial shade along road through pine forest" in Liberty, Garberson "in sand-loam soil along highway" in Brazos, M. C. Johnston "in sandy soil of swale in prairie" in Aransas County. Cory calls it "occasional in woods along a small creek" in Ellis, "occasional in dense herbaceous vegetation in sand along the road" in Jefferson, "occasional in sandy fields" in Galveston, and "infrequent in open woods along creek" in Anderson County, while C. M. Rogers calls it "frequent" in Colorado County. Runyon reports that the plant "is very common in fields and open ground through this region" in Cameron County, while Warner found it in "transition black soil to sand, in red clay and sandy loam, prefers presence of clay" in Montgomery County.

Tharp, Turner, & Johnston found it inhabiting a "gumbo glade" (a local prairie on tight marly clay completely surrounded by pines on sand)" in Polk County, McDougall in "old field weed stage" in Jefferson County, and the Lundells in "wet pineland along roadside" in Hardin County. Jones, Rowell, & Johnston (1961) state that it inhabits "swales, ravines, ditches, etc.", flowering in summer and fall.

In Louisiana the species was found by Shinners "in yellow-gray clay on highway rights-of-way". It has been in cultivation in Europe since 1840. Common names reported for it are "Gulf vervain", "hoary vervain", and "vervain". C. L. Lundell 5047 is a low many-lobed form. Demaree 32009 in the Leiden herbarium shows a fasciated inflorescence.

The flower color of V. xutha is described as follows by various collectors: "lavender" -- Ferris & Duncan 3268, C. L. Lundell 11921 & 14135, and Lundell & Lundell 11522 & 13107; "blue-lavender" -- C. L. Lundell 14082; "lavender-blue" -- Shinners 23982; "pale lavender-blue" -- Traverse 770; "bluish-lavender" -- C. L. Lundell 15082; "bluish-violet" -- F. B. Jones 2695; "gray-lilac" -- Kuntze 23811; "violet" -- Brenning s.n. [17.6.1904] & C. M. Rogers 6536; "purple" -- Tharp, Turner, & Johnston 54706; "pinkish-white with white throat" -- Traverse 2510.

This plant is often attacked by the fungi Cercospora papillosa Atk. and C. verbenicola Ellis & Ev. according to Seymour (1929). Material has been misidentified and distributed in herbaria under the names Verbena carolinense (Walt.) Gmel., V. carolinensis (Walt.) J. F. Gmel., V. caroliniana L., V. halei L., V. halei Small, V. hastata L., V. littoralis H.B.K., V. neomexicana (A. Gray) Small, V. officinalis L., V. polystachya H.B.K., V. scabra Vahl, V. stricta L., V. stricta Vent., Phyla incisa Small, Stachytarpheta sp., and even Lythrum californicum T. & G.

On the other hand, the F. B. Jones 1924, distributed as Verbena xutha, is actually V. brasiliensis Vell.; Edw. Palmer 1047 is V. canescens H.B.K.; Lindheimer III.500, McKelvey 1710, and E. D. Schulz 526, as well as E. J. Palmer 9183, are V. canescens var. roemeriana (Scheele) Perry; M. E. Jones 28296 is either V. canescens var. roemeriana or V. neomexicana var. hirtella Perry; M. E. Jones 29188, Molby 7221, and Williges 5c are V. cloverae Moldenke; A. M. Hildebrandt s.n., E. J. Palmer 9111 & 9485, and E. D. Schulz 103 are V. halei Small; H. H. Bartlett 10021, T. S. Brandegee s.n. [Hermosillo, May 14, 1892], and Wölflin s.n. [1845] are V. menthaefolia Benth.; E. L. Greene s.n. [Prinos Altos Mts., Aug. 23, 1880], S. S. Marsh 3099, C. H. Mueller 8138, and Tharp 4493 are V. neomexicana (A. Gray) Small; H. C. Hanson 645, Parks & Cory 7034, Parry, Bigelow, Wright, & Schott s.n. [Valley of the Rio Grande below Doñana], Shreve 9089, Tharp 3687, 8744, s.n. [Devine-Dilley, March 1, 1930], s.n. [Wilson Ranch, 6/19/31], & s.n. [6-19-31], and M. S. Young 101 are V. neomexicana var. hirtella Perry; Goodding 2246, Herb. LeRoy s.n. [Ariz. '84], LeSueur 875, Pringle s.n. [Santa Rita Mts., May 11, 1884], R. Runyon 55, Schery 32, and Wynd & Mueller 525 are V. neomexicana var. xylopoda Perry; C. T. Mohr s.n. [ballast ground, Mobile, 5/30/1887] is V. officinalis L.; E.G. Marsh 1378 is V. perennis Wooton; McKelvey 1756 is V. plicata Greene; and H. C. Hanson 496, F. B. Jones 1925, Killip 42107, R. Runyon 522, and Tharp 1201 are V. runyoni Moldenke, while the E. W. Nelson 6096, distributed as "Aff. V. halei or V. xutha" is V. pinetorum Moldenke.

C. C. Albers 33017, R. Runyon 1777, and L. F. Ward s.n. [Hearne, Sept. 11, 1877] are mixtures with V. halei Small; Bogusch 1235 is a mixture with V. scabra Vahl; and T. Drummond s.n. [New Orleans, 1832] is a mixture with Stylodon carneus (Medic.) Moldenke. Watson (1883) maintains that Edw. Palmer 2037 is "probably a hybrid between V. polystachya or V. urticaefolia and V. xutha", but I regard it as representing typical V. ehrenbergiana Schau.

H. Ness, in a letter to Dr. J. K. Small dated August 24, 1899, says "I also include in this letter a specimen of Verbina, to which I am unable to find anything agreeing. This plant I collected a month ago on sandy land in this county. Mr. Reverchon, who was along collecting, could not remember that he had ever seen this species before. It has the appearance of, and is often found in company with V. zutha but is much larger, 3--5 feet high, leaves broader, and the lower much less lobed tha V. zutha. It is also more hairy, and bears larger flowers. If this species is a stranger to you I will send you better specimens. I would like to have your opinion on this plant.....[It] is a perennial, with somewhat sparcely branched stem." Dr. Small identified the plant as V. xu-

tha, and with this identification I fully agree.

Pellett (1947) reports that V. xutha yields nectar sparingly for honey in Texas. The Coulter reference given in the bibliography above is sometimes cited with the date "1894", which is incorrect for the page in question. The Appleman s.n. [Hot Springs] cited below does not actually have "Texas" on its label, but I am assuming that it was from that state, rather than from any of the localities with similar names in Arkansas, Montana, North Carolina, South Dakota, or Virginia.

Schauer (1847) cites Tainturier s.n. from Louisiana and Lindheimer s.n. from near Houston, Texas, in the DeCandolle Herbarium at Geneva and cultivated material in the Botanical Garden at Berlin. He comments "Hab. in America tropica. Conf. V. Ehrenbergianam."

Perry (1933) cites the following 35 additional specimens not as yet seen by me: ARKANSAS: Miller Co.: Eggert s.n. [Homan, 10 June 1898] (E); Letterman s.n. [Texarkana, Aug. 1881] (E). LOUISIANA: Cameron Par.: S. M. Tracy 8708 (E, F, G). Natchitoches Par.: E. J. Palmer 7556 (E). Orleans Par.: T. Drummond 253 bis (K). Rapides Par.: C. R. Ball 605 (E). Saint Martin Par.: Langlois s.n. [St. Martinsville, 30.V.1893] (E). Parish undetermined: T. Drummond s.n. (G); J. Hale s.n. (E, G). TEXAS: Austin Co.: Lindheimer 145 (E). Brazoria Co.: B. F. Bush 899 (E), 1275 (E). Brazos Co.: H. Ness s.n. [sandy land, Brazos Co., 1899] (G); J. Reverchon s.n. [College Station, 24 July 1899] (E). Gregg Co.: Eggert s.n. [near Longview, 7 June 1899] (E); J. Reverchon 2532 (E). Guadalupe Co.: Groth 187 (F, G). Harris Co.: J. Ball s.n. [Cypress City, May 1877] (E); Ferris & Duncan 3268 (E); Lindheimer 154 (E, G). Jackson Co.: J. A. Drushel 2842 (E). Jefferson Co.: Tharp 3166 (E). Montgomery Co.: Dixon 473 (F, G). Navarro Co.: J. Reverchon 2118 (E). Palo Pinto Co.: Lindheimer s.n. [Brazos, July 1899] (E). Travis Co.: E. D. Schulz 701 (W). Washington Co.: E. Hall 434 (E, F, G). The "Munz 1607" cited by her is undoubtedly the same collection cited by me as Munz 1601. She comments: "This species is easily distinguished by its erect habit, coarse pubescence, elongated open spike, and sessile commonly trifid leaves. It has often been confused with V. canescens var. roemeriana, but the latter is a smaller and more compact plant."

In all, 345 herbarium specimens and 2 mounted photographs, including type or phototype material of most of the names involved, have been examined by me.

Citations: ALABAMA: Mobile Co.: C. T. Mohr s.n. [Navy Cove, Aug. 1889] (W--771855). Montgomery Co.: Koepper, Justice, & Isely s.n. [Oct. 3, 1943] (Dp--38319). MISSISSIPPI: Harrison Co.: Demaree 32009 (Le); Small & Alexander s.n. [near Pass Christian, May

1931] (N). Hinds Co.: W. H. Rhoades s.n. [Jackson, July 1927] (Bt, N), s.n. [Jackson, 1927] (Bt--5921). Jefferson Co.: McDougall 1033 (W--1925220). Warren Co.: Moldenke & Woods 523 (B, Fg, S); W. H. Rhoades s.n. [Vicksburg, July 1927; H. N. Moldenke 17088] (Br, Bt, Bt--30141, Hs, N, St), s.n. [Vicksburg, July 1931] (N), s.n. [Battleground Bluff, 7-1931] (Bt--61221). ARKANSAS: Ashley Co.: Demaree 24518 (Lb--46760, Sm). Chicot Co.: Demaree 23265 (Sm). Cleveland Co.: Demaree 23313 (Z). Hempstead Co.: Demaree 44667 (Ca). Miller Co.: Eggert s.n. [along railroads, 10 June 1898] (N); Letterman s.n. [Texarkana s.n., 1881] (W--71977). LOUISIANA: Ascension Par.: T. L. Andrews s.n. [Ascension, 13-1] (Io--83618). Avoyelles Par.: A. R. Moldenke 724 (S); Penfound s.n. [May 16, 1946] (Tl). Beauregard Par.: A. R. Moldenke 707 (S). Bossier Par.: A. R. Moldenke 678 (S). Cameron Par.: S. M. Tracy 8708 (Es, Lb--27628, N, Tr, Up--50343, W--510600). East Baton Rouge Par.: Joor s.n. [July 6, 1874] (Mi). East Feliciana Par.: M. Carpenter s.n. [Feliciana, May 1840] (W--771857). Grant Par.: I. L. Forbes s.n. [Colfax, Aug. 20, 1927] (Ca--351574, Io--129293). Jefferson Par.: L. H. Bailey 7339 (Ba); L. E. Fox 2107 (Fx). Lafourche Par.: Arceneaux 93 (It). La Salle Par.: Shinners 23982 (Hi--197645, Tl). Natchitoches Par.: E. J. Palmer 7556 (Gg--182147, W--1531646). Orleans Par.: Brenning s.n. [17.6.1904] (B); Cocks s.n. [New Orleans] (Tl); T. Drummond s.n. [New Orleans, 1832] (Lu, S), s.n. [New Orleans, 1833] (Lu), s.n. [env. N. O.] (Vi); Holzer s.n. [New Orleans] (Mi); J. M. McArthur s.n. [7/21/28] (Tl). Plaquemines Par.: Langlois 123 (W--1323140), 612 (Cm), s.n. [July 1878] (Du--91128), s.n. [25 June 1884] (Al). Rapides Par.: C. R. Ball 605 (W--382844). Red River Par.: A. R. Moldenke 689 (S). Saint Charles Par.: Ewan 17704 (Tl). Saint James Par.: Small & Alexander s.n. [near Convent, Apr. 1931] (N). Saint Martin Par.: Correll & Correll 9447 (H--78927, N, No--18408); Langlois s.n. [St. Martinville, 30.V.1893] (Ba, I, I, N, W--1465963). Terrebonne Par.: Bynum, Ingram, & Jaynes s.n. [3 mi. w. of Cocodrie] (N); Munz 1601 (Po--124052). Parish undetermined: Dormon s.n. [1930] (N); Herb. Chapman s.n. [Louisiana] (C). TEXAS: Anderson Co.: Cory 54638 (No--15143, Rf). Aransas Co.: Cory 45878 (N), 45879 (Au, Sm), 51177 (Sm); M. C. Johnston 53253.1 (Au--122882), 53253.2 (Au--122883), 53253.3 (St); F. B. Jones 3195 (Ww); Uzzell 17 (Ar--123390). Austin Co.: F. W. Pennell 10279 (N); H. Wurzlow s.n. [Industry, 1891] (Ur). Bastrop Co.: B. H. Warnock 46439 (Au, N). Bell Co.: S. E. Wolff 829 (W--1622068), 1016 (W--1622581), 4364 (Tr). Bowie Co.: Letterman 394 (Du--91133), 5477 (N), s.n. [Texarkana] (W--986684). Brazoria Co.: B. F. Bush 899 (We); Kil-

lip 40591 (W--2005590). Brazos Co.: Garberson 293 (St); W. S. Jennings 155 (Ok); H. Ness s.n. [Aug. 1; Reeves 202] (Cs), s.n. [July 16; Reeves 203] (Cs), s.n. [Aug. 16; Reeves 205] (Cs), s.n. [July 1899] (N), s.n. [June 26, 1925] (Tr); H. B. Parks s.n. [6-7-47] (Au), s.n. [White Creek, 9-7-47] (S); Reeves 191 (N), 194 (Cs). Brewster Co.: Appleman s.n. [Hot Springs] (La). Burleson Co.: Trew 104 (Au—122827). Calhoun Co.: Harold Gentry 57 (Au, N, N). Cameron Co.: Clover 1695 (N); Mrs. Cottrell 8743 (Au); Ecology Class Univ. Texas s.n. [Palm Grove, 3.1.30] (Au); R. Runyon 1777, in part (Rr). Chambers Co.: Cory 50987 (Sm); Tharp s.n. [Anahuac, July 22, 1929] (Au, Au); Traverse 2510 (Au—208479). Colorado Co.: C. M. Rogers 6536 (Au--122826). DeWitt Co.: M. Riedel s.n. [7-4-41] (Au); E. D. Schulz s.n. [5/11/1938] (Wi); Webster & Rowell 7065 (Au, N). Ellis Co.: Cory 53386 (N). Fayette Co.: Matthes 13 [Macbride photos 34343] (Kr—photo, N--photo); B. H. Warnock 46297 (Au, N, S). Fort Bend Co.: Munz 1470 (Po--121658). Freestone Co.: Harding 399 (St--17058). Galveston Co.: Cory 51020 (N, Sm, Sm, W—1886098); Dapprich 7764, in part (Sm); G. L. Fisher 212 (W--1074640), s.n. [San Leon, July 7, 1929] (Bt-33687, Gg—290880); Mrs. A. F. Nelson s.n. [11-2-41] (Au); Parks & Cory 20201 (Tr). Goliad Co.: C. B. Williams 148 (Au). Gonzales Co.: C. C. Albers 46092 (Au, N); Bogusch 970 (Au), 1235, in part (Po—161325), 1351 [Herb. Univ. Texas 970] (W—1328540); Flemming s.n. [Rutledge Swamp, Oct. 9, 1934] (Au, Au); Parks & Cory 10068 (Tr); Tharp 253 (Au). Gregg Co.: J. Reverchon 2532 (N). Grimes Co.: Lynch s.n. [Plantersville, 10/28/31] (Au); J. N. Weaver 1039 (N); T. V. Weaver 1039 (Ml). Guadalupe Co.: Groth 187 (Dt, Gg—31432, Io—75837, N, W—717776). Hardin Co.: C. L. Lundell 14082 (N, Rf); Lundell & Lundell 11522 (N, Rf). Harris Co.: Armer s.n. [Houston, July 1927] (Au); L. H. Bailey 310 (Ba); Boll s.n. [Cypress City, May 1877] (E--117233); Boon 61 (Au), 291 (Au, N), 20001 (Au, N); Condit s.n. [Houston, June 19, 1909] (Ca--456149); O. Degener 5171 (Ms, N); Eifrig s.n. [Houston, June 1926] (Ca—882857, Mn—35073); Ferris & Duncan 3268 (Du—125419, Gg—31433, N); G. L. Fisher 82 (W--503153), 51048 (Ew, Go), s.n. [Houston, June 9, 1912] (Vi), s.n. [Houston, May 18, 1914] (Hp), s.n. [Houston, May 16, 1934] (Gg--237866); Fitzgerald 296 (Bl—42367); Joor s.n. [July 16, 1875] (Mi); Killip 45699 (W—2234120); Kuntze 23811 (N); W. H. Lewis 5300 (Nb); Lindheimer I.154 (Ca—248431, W-1870923), s.n. [Houston, 1843] (Pr, W—1870846); Lundell & Lundell 13107 (N, Rf); C. T. Mohr s.n. [Harrisburg] (W--771856); O. Mueller 10-14 (Wi); E. D. Schulz 37-93 (Wi); Tharp 4498 (Au); Traverse 770 (Au—168129, Rf). Hays Co.: S. W. Stanfield s.n. [San Marcos and vicinity, summer 1898] (N). Jackson Co.: J. A. Drushel 2842

(Ur); A. R. Moldenke 207 (Fg); Tharp s.n. [8/30/41] (Au), s.n. [Sept. 27, 1941] (Au). Jeff Davis Co.: E. J. Palmer 34370 (N). Jefferson Co.: C. C. Albers 34005 (Au, Au); Cory 50962 (Sm), 50968 (N, Sm, Sm, W--1886083); Golub s.n. [Beaumont, July 8, 1938] (Ms); Kolthoff s.n. [4 Maj 1927] (S), s.n. [10/5/1927] (S); W. H. Long s.n. [Beaumont, May 28, '01] (Au); C. L. Lundell 14135 (N, Rf, W--1927002); Parks & Cory 19878 (Tr); Tharp 3166 (Au), 3167 (Au), s. n. [McFadden Beach, 9/10/37] (Ca--882855), s.n. [McFadden Beach, 9/11/37] (Au, Au, N, Pl--151555, W--1873784), s.n. [9/12/37] (Au, Au); M. S. Young s.n. [Port Arthur, 4/21/18] (Au). Kaufman Co.: E. Hamby 1285 (Ar--206803). Lavaca Co.: G. L. Fisher 122 (W--503192). Lee Co.: J. F. Brenckle 48076 (N), 49075 [48075] (N). Leon Co.: E. C. Smith s.n. [Oakwood, 5-12-1942] (Fc). Liberty Co.: F. W. Gould 6922 (Au--122868); Harding 172 (St--17565); C. L. Lundell 15082 (Rf, W--2297897). McLennan Co.: L. D. Smith 649 (Au--122873, St). Milam Co.: S. E. Wolff 4023 (Tr). Montgomery Co.: Dixon 473 (N); Warner s.n. [Willis] (Hu). Navarro Co.: J. Reverchon 2118 (W--387015); Lloyd Williams 47 (Au). Polk Co.: Tharp, Turner, & Johnston 54706 (Au--122904, St). Refugio Co.: A. R. Moldenke 199 (Fg, S). Robertson Co.: L. Morris 42 (Au); F. J. Tyler s.n. [Calvert, May 13, 1904] (W--500804); L. F. Ward s.n. [Hearne, Sept. 11, 1877] (W--147568). San Patricio Co.: F. B. Jones 4056 (Ww). Travis Co.: F. A. Barkley 13365 (Au, N); Cohn & Barkley 13253 (N); L. C. Hinckley 1403 (N); C. L. Lundell 11921 (N, Rf, Rf, Rf); R. H. Painter 16 (Ka--71742); E. D. Schulz 679 (W--1104945, Wi, Wi), 700 (Wi); Strandtmann s.n. [July 26, 1940] (Au); Tharp 667 (Au, Au, W--1104641, Wi), 668 (Au, W--1104642, Wi), s.n. [Walnut Cr., 7/12/20] (Io--104882), s.n. [Walnut Creek, spring 1921] (Io--104881), s.n. [8-7-40] (Au); York, Copeland, & Johnson 6048 (Au). Tyler Co.: Tharp, Turner, & Johnston 54838 (Au--122903, St). Victoria Co.: F. B. Jones 2695 (Ww); F. L. Lewton 765 (Ar--271725); E. D. Schulz 2495 (Gg--162244, Wi). Walker Co.: Albers & Warnock 45136 (Au, N); Parks & Cory 10437 (Tr); Tharp s.n. [6/11/35] (Ca--882856, Vi); Warner s.n. (Au, W--1114303). Waller Co.: W. H. Lewis 5372 (Nb); H. B. Parks 2432 (Au). Washington Co.: C. C. Albers 33013 (Au), 33017, in part (Au); Brackett 253 (Au), s.n. [Apr. 21, 1939] (Au); Gander 7596 (Sd--25483); E. Hall 434 (N, Po--70981, Pr, W--71996). Wharton Co.: J. A. Drushel 10435 (N); A. R. Moldenke 210 (Fg); E. J. Palmer 6622 (Po--217660, W--1581013). Williamson Co.: Whitehouse s.n. [Cedar Park, July 8, 1929] (Au, Au). High Island [Galveston Co.]: O. M. Clark 3944 (B). County undetermined: Belfrage s.n. [28.4.1860] (S); Herb. Univ. Texas s.n. (Au, Au); Kuntze s.n. [Aug. 1904] (N); Lindheimer s.n. [Fasc. IV, 1849] (Ka); H. Ness 144 (Tr, Tr, Tr, Tr, Tr, Tr, Tr, Tr, Tr, Tr, Tr, Tr,

Tr, Tr, Tr), s.n. (Tr). ARIZONA: Cochise Co.: R. D. Camp 2611 (Wi). CULTIVATED: Belgium: M. Martens s.n. [h. b. Lov. 1840] (Br). New York: G. V. Nash s.n. [1903; N. Y. Bot. Gard. Cult. Pl. 18690] (N); N. Taylor s.n. [1904; N. Y. Bot. Gard. Cult. Pl. 18690] (N). Texas: E. Hall s.n. (W--71979). LOCALITY OF COLLECTION UNDETERMINED: McKay 2109 (S).

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BOOK REVIEW

Alma L. Moldenke

"Algal Cultures and Phytoplankton Ecology", by G. E. Fogg, xiii + 126 pp., illust. The University of Wisconsin Press, Madison, Wisconsin. [1964] 1965. $5.50

Now readers will have the same privilege of learning about this information as did the listeners to Dr. Fogg's lectures in '63 [from which this excellent book is compiled] at the University of Wisconsin.

In the "introduction" the author explains how laboratory controlled physiological and biochemical studies of culturing truly phytoplanktonic algae can offer much to interpreting the detailed observations made in natural bodies of fresh and salt water.

He continues with "the characteristics of algal growth in cultures of limited volume", emphasizing the factors that even the limiting container provides, the fact that no truly planktonic form is known to survive in the dark even with supplemented substrates, and the conclusion that there is no single criterion for measuring growth.

Next he explains "the growth of algae in continuous and synchronous cultures" using the Myers and Clark turbostat and the Monod chemostat for studying population density in controlled media.

In describing "metabolic patterns and growth", the author mentions how different species tend to resemble each other in the relative amounts of their organic nutrients when grown under similar conditions, even though it is known that algal groups are characterized by particular pigments, carbohydrates, sterols, etc.

Among "the general features of the phytoplankton growth in lakes and the sea" is most prominent their patchy horizontal and vertical distribution with the growth rate of the biomass varying greatly with cell size, etc.

"The increase of phytoplankton in temperate waters in the spring" is the most dynamic feature of this ecology, arising from the increase and intermingling of holoplanktonic types always in the water and of meroplanktonic types emerging from resting stages in bottom deposits.

"Some other aspects of phytoplankton periodicity" are discussed.

The "distribution and seasonal succession" of the various organ-

isms in the biomass includes its pioneers and its climax forms whose positions are controlled by the rates of growth and the biochemistry of the internal and external environments.

Although the author stresses the need for study of truly planktonic forms rather than the soil dwelling algae, he quotes many studies on Chlorella and on Monodus subterraneus. There is a good index, a fine bibliography, and several helpful illustrations -- some even in color.

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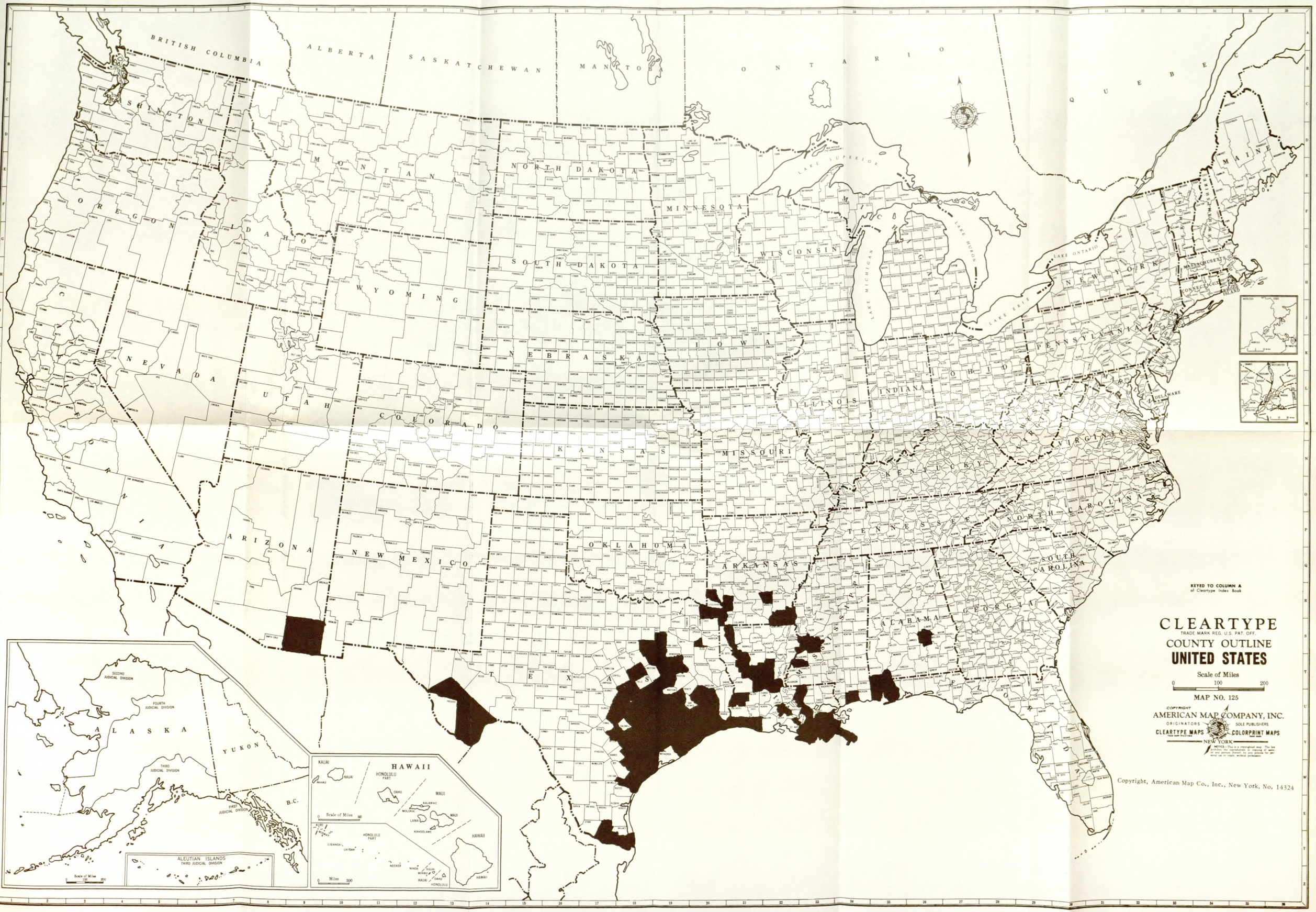
Figure 20. Distribution of Verbena xutha in the United States

Herbarium curators who have material of this species from additional counties are asked to send it to the author for verification and record, so that future editions of this map may be more complete

Mapping by counties done by Andrew R. Moldenke



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